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Issue No 29



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REGULARS

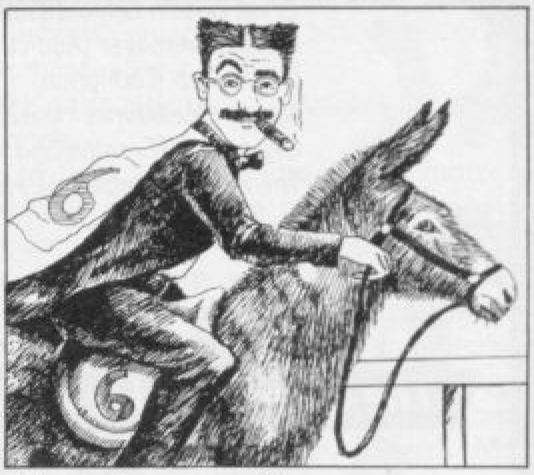


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Clive's New World

SIR CLIVE SINCLAIR has a dream. A dream of the future when all men shall be free from the drudgery of working lives, free to philosophise and cultivate a love of the fine arts. A dream of a silicon civilisation, computerised and automated, safe and sound. A dream of high-speed hovercars, instantaneous long-distance communication, robot doctors, computer teachers and android aids for the elderly. A dream of artificial worlds constructed in the vacuum of space, of mankind realising its destiny and reaching for the stars . . .

He is not the first to have such a dream. The concept of an Ideal State, a Utopia achieved by man's efforts, has been proposed and discussed by scientists and philosophers for centuries. The belief that advances in science might transform and improve society was first advocated in the early 17th century by Francis Bacon and Tommaso Campanella and satirised by Swift and Johnson a century later. The debate between the proponents and the critics of technological utopias has been continuing ever since.

'Sir Clive has so few fears of the day when the machines take over'

Neither has Sir Clive brought anything new to that debate. Indeed, his silicon city of the future will be so familiar to readers of science fiction as to appear almost old-fashioned. Sir Clive, however, has one distinct advantage over his predecessors. Whereas 50 years ago imaginative writers such as H G Wells merely guessed the shape of things to come, Sir Clive, speaking in 1984, knows how the future will be.

In his speech, addressed to the U.S. Congressional Clearing-house on the Future, there is little to cause a raising of eyebrows. When he describes cordless telephones, robot assembly lines and electric cars he is describing things as they already are. When he speaks of the loss in manufacturing employment and the replacement of lawyers, teachers, doctors and nurses by robots he is describing things as they will be once automation really gets going. There are no surprises here.

What is surprising is that Sir Clive has so few fears of the day, now rapidly approaching, when the machines take over. Since the beginning of this century the prevailing mood of speculative writing has been one of despair and pessimism, and as science has progressed the more pessimistic the prognostics. It was only 1909 when E M Forster presented his nightmarish depiction of the fully-automated society in *The Machine Stops,* where man's every need is supplied by the machine at the touch of a button and television is the only form of communication. Since Forster wrote his story, other more terrifying visions have been offered, from the plastic paradise of Aldous Huxley's *Brave New World* to computerised tyranny of Kurt Vonnegut's *Player Piano.* For years the message has been clear — science gives with one hand but takes away with the other.

To give Sir Clive his due, he acknowledges that his silicon utopia has some negative aspects. The inhabitants of the future might be "unemployed and very miserable" but that, he feels, would be only a 'temporary pattern'. He draws an analogy with the freemen of Periclean Athens who were able to devote their time to the study of science and art. "We may experience an age as golden as that of Greece," he says.

Sir Clive does not tell us how that golden age is to be free from all the troubles that beset the present. Perhaps he hopes that the advancement of science has solved the problems of over-population and pollution, the droughts in Africa and the floods in India, the cold war and the nuclear arms race.

Even if those seemingly insurmountable hurdles have been overcome there remains the pig-headedness of man himself. Sir Clive has ignored the tendency of human nature always to trivialise its achievements, always to choose the soft option. If present trends continue it is far more likely that increased leisure time will be spent watching videos and playing computer games than in finding the answer to life, the universe and everything.

In *Micromania,* by Charles Platt and David Langford, an alternative to the silicon utopia is suggested, which is altogether more credible and more depressing. The writers envisage the family of the future confined to their self-sufficient all-aluminium living module, with the children linked into their teaching machines, the husband working in his study with his picturefone and computer terminal, and the wife supervising the cleaning robots and programming the day's meals.

Domestic strife is at an all-time high because families spend all their time at home. The advantages of electronic mail are more than out-weighed by the incidence of electronic fraud, which entails the encoding and decoding of all correspondence. The labour-saving domestic appliances have a tendency to malfunction and consequently must be overseen. Everything is voice-actuated and echo-checked so their human operators seem to spend all their time talking and listening to themselves. Entertainment is in the form of inter-active soap operas and Videosex substitutes for the human contact which has no place in a mechanised environment.

'There never has been, and never will be, a golden age on Earth'

Meanwhile, in the cities, the unskilled, uneducated and unemployed are rioting.

That, according to Platt and Langford, is the future if "we allow gadget-happy designers to mesmerise us with technology for its own sake, and instead of computers serving us we somehow end up serving them". It is a cynical view but one to bear in mind when gurus like Sir Clive Sinclair attempt to justify the increasing computerisation of society by holding out the carrot of a 'golden age'. There never has been and never will be, unless human nature is utterly transformed, a golden age on Earth. Man will simply muddle through, as he has always done.

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August games include latest from Cheetah

Bats attack club members

THE SPECTACULAR software on offer this month covers all three Sinclair machines.

Cheetahsoft, an up-and-coming young company, provides action for the 48K Spectrum owner. The first offering is **3D Bat Attack,** a game you should be able to get your teeth into. It is a maze game in which you must gather as much gold as you can in the corridors where vicious vampire bats are lurking, swinging from their dark roosts on to any unsuspecting travellers below.

To complete the game you must outwit the nocturnal creatures whose only purpose is to kill you. There are four levels of play.

In complete contrast is **Conquest,** a strategy game set in Mediterranean Europe. Also by Cheetahsoft, the game casts you in the role of a great warlord, your task being to conquer as much territory as possible. There are five levels of play.

Micromega is offering three 16K Spectrum games to club members — **Luna Crabs, Haunted Hedges** and **Starclash.** As an added bonus, we will knock an extra £1 off the price if you buy all three games, making a total saving of £4. In Luna Crabs you must fight hordes of lethal crustaceans as they converge on your spacecraft. Haunted Hedges drops you into a maze of 3D hedges with ghosts lurking in the shadows to impede your progress through the shrubberies, while Starclash is an exciting all-action game of inter-stellar conflict.

For ZX-81 owners we have obtained two games, both requiring the 16K RAM pack. Unicorn Software has produced **Bears in the Wood,** in which you play the part of the mother bear as she guides her family through the forest in search of honey.

Climber, also from Unicorn, is concerned with a futuristic tournament.

All the offers can be obtained only by members of the Club and are available until the end of August. If you are not a member but want to join this month, you can take advantage of the offers by sending an order with your membership fee.

	List price	Offer price
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Britain

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Aylesbury ZX Computer Club: Ken Knight, 22 Mount Street, Aylesbury (5181 or 630867).

Basildon: Roundacre Microcomputer Users' Club. J Hazell, Basildon 285119/416333. Meetings every Wednesday 7.30 to 10.30pm.

Bristol Yate and Sodbury Computer Club: 99 Woodchester Yate, Bristol, BS17 4TX.

Cardiff ZX Club: Steve Smith (0222) 593237 or Mike Hayes (0222) 371732. Meets twice a month.

Colchester Sinclair User Group: Richard Lown, 102 Prettygate Road, Colchester CO3 4EE.

Cornard Sinclair User Group: Neil MacDonald, 15 Potkiln Road, Great Cornard, Sudbury, Suffolk CO10 0DA.

Crewe and Nantwich Computer Users' Club: J E A Symondson, 46 London Road, Stapeley, Nantwich, Cheshire CW5 7JL.

Daventry & District Computer Club: c/o Daventry Ex-servicemen's Club, Market Square, Daventry, Northants.

Doncaster and District Micro Club: John Woods, 60 Dundas Road, Wheatley, Doncaster DN2 4DR; (0302) 29357.

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Edinburgh: Edinburgh Home Computing Club. John Palmer (031 661 3183) or Iain Robertson (031 441 2361).

EZUG-Educational ZX-80-81 Users' Group: Eric Deeson, Highgate School, Birmingham B12 9DS.

Furness Computer Club: R J C Wade, 67 Sands Road, Ulverston, Cumbria (Ulverton 55068). Meets every other Wednesday.

Glasgow ZX-80-81 Users' Club: Ian Watt, 107 Greenwood Road, Clarkston, Glasgow G76 7LW (041 638 1241).

Gloucester: Mid-weekly Spectrum User Group. Barry Ledbury, 8 Linnet Close, Gloucester GL4 9XA (0452) 23186.

Gravesend Computer Club: c/o The Extra Tuition Centre, 39 The Terrace, Gravesend, Kent DA12 2BA. Bi-monthly magazine and membership card.

Hassocks ZX Micro User Club, Sussex: Paul King (Hassocks 4530).

Inverclyde ZX-81 Users' Club: Robert Watt, 9 St. John's Road, Gourock, Renfrewshire PA19 1PL (Gourock 39967). Meets every other Monday at Greenock Society of the Deaf, Kelly Street, Greenock.

Keighley Computer Club: Colin Price, Redholt, Ingrow, Keighley (603133).

Lambeth Computer Club: Robert Baker, 32 Heatherington Road, London SW4 7NX.

Liverpool ZX Club: Meetings every Wednesday 7pm at Youth Activities Centre. Belmont Road, Liverpool 6. Keith Archer, 031-236 6109 (daytime).

Llanelli Computer Club: 40 Tan-Y-Bryn, Burry Port, Dyfed. Llanelli 56917.

Manchester Sinclair Users' Club: Meets every Wednesday, 7.30pm, at Longsight Library, 519 Stockport Road, Longsight — 061-225 6997 or 061 445 6316.

Meopham: National ZX Spectrum User Club. Guy Fullalove, Woodcotes, Camer Park, Meopham, Kent DA13 0XS. Bi-monthly newsletter, subscription £1.50. Send SAE for details.

Merseyside Co-op ZX Users' Group: Keith Driscoll, 53 Melville Road, Bootle, Merseyside L20 6NE; 051-922 3163.

Micro Users' Group: 316 Kingston Road, Ewell, Surrey KT19 0SY.

Mid-Kent Micro Club: Meets once monthly. Enquiries to M Gates, 65 Buckland Road, Maidstone ME16 0SH.

Mill Lane Association Computer Group: Bryan McAlley, 1 Cowleaze, Chinnor, Oxfordshire. (0844) 52426.

Newcastle (Staffs) Computer Club: Meetings at Newcastle Youth and Adult Centre, Thursday, 7.30. Enquiries to R G Martin (0782 62065).

North Hertfordshire Home Computer Club: R Crutchfield, 2 Durham Road, Stevenage; Meetings: first Friday of the month at the Settlement, Nevells Road, Letchworth.

Northern Ireland Sinclair Users' Club: P Gibson, 11 Fitzjames Park, Newtownards, Co Down BT23 4BU.

North London Hobby Computer Club: ZX users' group meets at North London Polytechnic, Holloway Road, London N7 Monday, 6pm.

Nottingham Microcomputer Club: ZX-80-81 users' group, G E Basford, 9 Holme Close, The Pastures, Woodborough, Nottingham.

Orpington Computer Club: Roger Pyatt, 23 Arundel Drive, Orpington, Kent (Orpington 20281).

Perth and District Amateur Computer Society: Alastair MacPherson, 154 Oakbank Road, Perth PH1 1HA (29633). Meetings: third Tuesday of each month at Hunters Lodge Motel, Bankfoot.

Regis Amateur Microcomputer Society: R H Wallis, 22 Mallard Crescent, Pagham, Bognor Regis, West Sussex PO21 4UU.

Roche Computer Club: 8 Victoria Road, Coop Rooms, Roche, Cornwall: 0726 890473. Twice weekly meetings, Monday and Friday.

Saltcoats Computer Club: Colin Borland, 117 High Road, Saltcoats, Ayrshire KA21 5SD. Weekly meetings.

Sinclair Postal User Group: 24 St. Mary's Way, Code SUL, Chigwell, Essex IG7 5BX. Produces magazine with competitions.

Scunthorpe ZX Club: C P Hazleton, 26 Rilestone Place, Bottesford, Scunthorpe; (0724 63466).

Sheffield: South Yorkshire Personal Computing Group. R Alderton (0742 20571), S Gray (0742 351440), P Sanderson (0742 351895).

Sinclair Amateur Radio User Group: SAE or two IRCs for details. Paul Newman G4 1NP, 3 Red House Lane, Leiston, Suffolk IP16 4JZ.

Sittingbourne: Anurag Vidyarth (0795 73149).

St Albans: Bi-monthly meetings and a magazine. Details from Adam Slater, 40 Watford Road, St Albans, Herts AL1 2HA. (0727 54176).

Stratford-on-Avon Computer Club: Meets on the second Wednesday of every month. Telephone: 0789 68080 for details.

Swansea Computer Club: B J Candy, Jr Gorlau, Killay, Swansea (203811).

Swindon ZX Computer Club: Andrew Bartlett, 47 Grosvenor Road, Swindon, Wilts SN1 4LT; (0793) 3077. Monthly meetings and library.

Sutton: Sutton Library Computer Club, D Wilkins, 22 Chestnut Court, Mulgrave Road, Sutton, Surrey SM2 6LR.

West Sussex: Midhurst and District Computer User Group. Enquiries to V Weston (073 081 3876), R Armes (073 081 3279).

Worle Computer Club: S W Rabone, 18 Castle Road, Worle, Weston-super-Mare BS22 9JW (Weston-super-Mare 513068).

Universal ZX Club: Postal club for Spectrum owners in the U.K. and abroad. C. Shaw, 1 Swiss Walk, Batley, W. Yorkshire.

ZX-Aid: Conrad Roe, 25 Cherry Tree Avenue, Walsall WS5 4LH. Please include sae. Meetings twice monthly.

Overseas

Australia: Australian ZX Users' Newsletter, incorporating QL User. Paul Janson, P.O. Box 397, Dapto 3530, Australia. Also seeks unpaid contributions for the newsletter.—W.A. ZX Users' Group, Garth Gregson, 34 Chester Street, South Fremantle 6162. Phone 3351671.

Austria: ZX User Club, Thomas Christian, c/o Wissenschaft Forscht e. V., Postfach 141, A1190 Vienna. Meets every first Friday of the month. Telephone 0222-44 32 050 for details.

Belgium, France and Luxembourg: Club Micro-Europe, Raymond Betz, 38 Chemin du Moulin 38, B-1328 Ohain, Belgium (32/2/6537468).

Denmark: Danmarks National ZX-8081 Klub (DNZK), Jens Larson, Skovmosevej 6.4200 Slagelese, post giro 1 46 24 66.
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Finland: ZX-kerho, c/o Kalevi Hamalainen, Siltakatu 9 A 8, 33100 Tampere 10, Finland. Phone 35831-34238. Publishes quarterly paper.

France: Yves Chapron, no. SUS-1047, Rue du Puy, La Terrasse, 38660 Le Touvet, France. Specifically for users in the Alps.

Germany: ZX Club, a postal club; contact Aribert Deckers, Postfach 967, D-7000 Stuttgart 1, West Germany.

Greece: Athens Spectrum Club, Paris Stamelos, Spetsou 2, isi22 Marousi, Athens, Greece.

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Irish Amateur Computer Club: Martin Stapleton, 48 Seacourt, Clontarf, Dublin 3. (331304).

Irish Sinclair Users Club: PO Box 1238, Dublin 1. Publishes a newsletter. Send SAE for details.

Italy: Sinclair Club, Via Molino Vecchio 10/F, 40026 Imola, Italy.
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Spain: Club Nacional de Usuarios del ZX-81, Joseph-Oriol Tomas, Avda. de Madrid, No 203 207, 10, 3a esc. A Barcelona-14 Espana. International ZX Spectrum Club: Gabriel Indalecio Cano, Sardana, 4 atrico 2a, San Andres de la Barca, Barcelona. Send international reply coupon. Produces a bi-monthly magazine. Spanish ZX Micro Club: Apartado 181, Alicante (Costa Blanca), Spain.
ZX Club Spain; C Benito PO Box 3253, Madrid, Spain.

Swedish ZX-club: Sinclair Datorklubben, Box 1007, S-122, 22 Enskede.

United States: Bay Area ZX-80 User Group, 2660 Las Aromas, Oakland CA94611.—Harvard Group, Bolton Road, Harvard MA 01451: (617 456 3967).—SAF Users' Group, 2749 Eden Road, Leslie, Michigan 49251.

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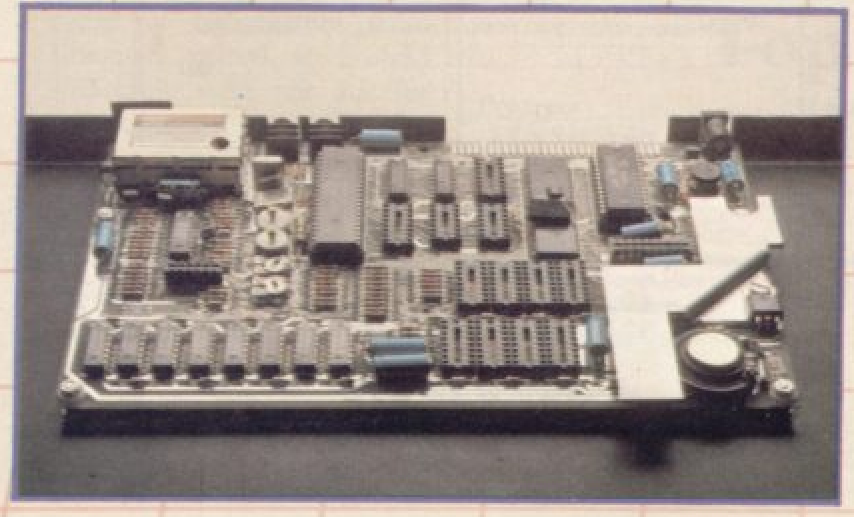
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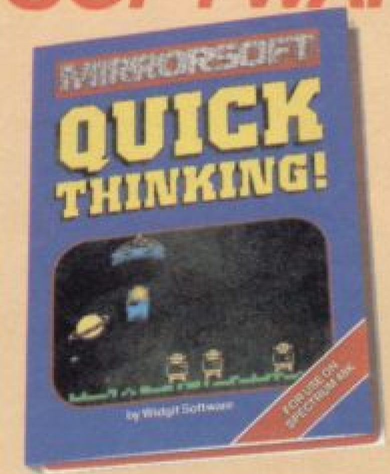
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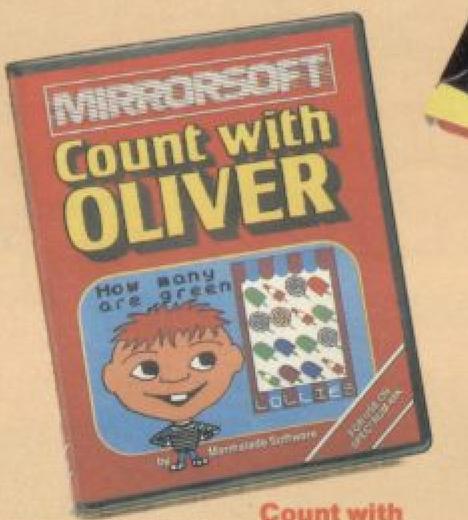
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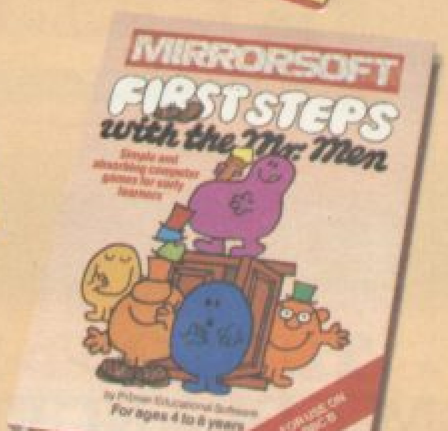
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Imagine teeters on the brink

ACUTE financial problems have compelled software house Imagine to sell its catalogue of best-selling titles and delay the launch of its new Megagames. The company has laid off staff and vacated its luxurious five-storey offices in the centre of Liverpool.

Imagine ran into difficulty earlier this year when publisher Marshall Cavendish rejected the games provided by the company for the new part-work *Input* and demanded repayment of a £200,000 advance. The crisis was accentuated by a slump in the software market and theft of stock from the Imagine warehouses.

An attempt to raise cash by lowering software prices met with objections from dealers and in a last-ditch effort Imagine decided to sell the rights to its games to London-based Beau-Jolly, sister company to Nouveau Records.

Imagine will continue to receive royalties from the titles, though it is rumoured as being as low as 10 percent of the retail price.

Beau-Jolly is launching compilation packages for the games for the Spectrum and Commodore computers. The value packs are in sets of four or six games, costing £16.49 and £21.40 respectively. In the meantime the de-luxe range of Megagames from Imagine, priced at around £20 each, were not due for release until July.

The company has moved to cramped accommodation at Teghebarn House, round the corner from its previous premises, but hopes to expand again when the Megagames are released and when, presumably, cashflow problems are overcome.

The Wrath of Magra —Carnell swan song?

CARNELL SOFTWARE, publisher of the highly-original adventures **Volcanic Dungeon** and **Black Crystal,** are on the brink of liquidation. Director Stuart Galloway has said he is unable to pay debts and has appointed a Reading firm as receiver in the event of liquidation.

The company still hopes to continue and has called a meeting of creditors to discuss the situation. Clive Digby-Jones, managing director of Websters, which distributes the games, says part of the problem was the long delay in the release of the latest game, **Wrath of Magra,** which was scheduled originally for early in the year. "We stepped in to help," he says, "by buying old stock in return for exclusive distribution rights, to permit concentration on Magra."

Wrath of Magra is now in its finished form, Carnell apparently lacks money to transfer the game to the stores. Digby-Jones hopes the game can still be marketed and will save Carnell from extinction.

"We like the people and the way they do things and would like to continue distributing the products," he says. If Carnell manages to stave off creditors until Magra is available it will be only



a temporary solution, as there will be little capital remaining for new projects.

Lynx liquidated

CAMPUTERS, the company which produced the Lynx microcomputer, has gone into liquidation. A meeting of creditors appointed Hacker Young and Partners and Cork Gully as joint liquidators.

Total company assets have been put at £94,250 but £877,000 is owed to the parent company Camputers plc and a number of trade creditors.

Company representatives have been approached by several potential buyers who have made a serious approach to the liquidators to acquire the Cambridge-based company. None has yet made a firm offer.

Dragon Data is another company which is in difficulty for the third time in its two-year life-span.

Touche Ross, the receiver for Dragon Data, is confident that the company will rise from the ashes. Several companies have shown interest in taking the flailing range of micros. They include Tandy, which produces a colour computer in the United States which has similar specifications to the Dragon 32.

One of the reasons given for the company's difficulties is failure to meet demand. That seems a strange excuse, since there are believed to be thousands of computers awaiting shipment with a total estimated value of £6 million.

Top Ten

Program	Last Month	Company	Memory
1 Jet Set Willy	1	Soft. Proj.	48K
2 Sabre Wulf	—	Ultimate	48K
3 Fighter Pilot	2	Digital Int.	48K
4 Blade Alley	—	PSS	48K
5 Psytron	—	Beyond	48K
6 Zaxxan	—	Starzone	48K
7 Blue Thunder	4	Willcox	48K
8 Jack & the Beanstalk	—	Thor	48K
9 Zaxxan	—	Starzone	48K
10 Scuba Dive	—	Durrell	48K

Figures supplied by W H Smith.

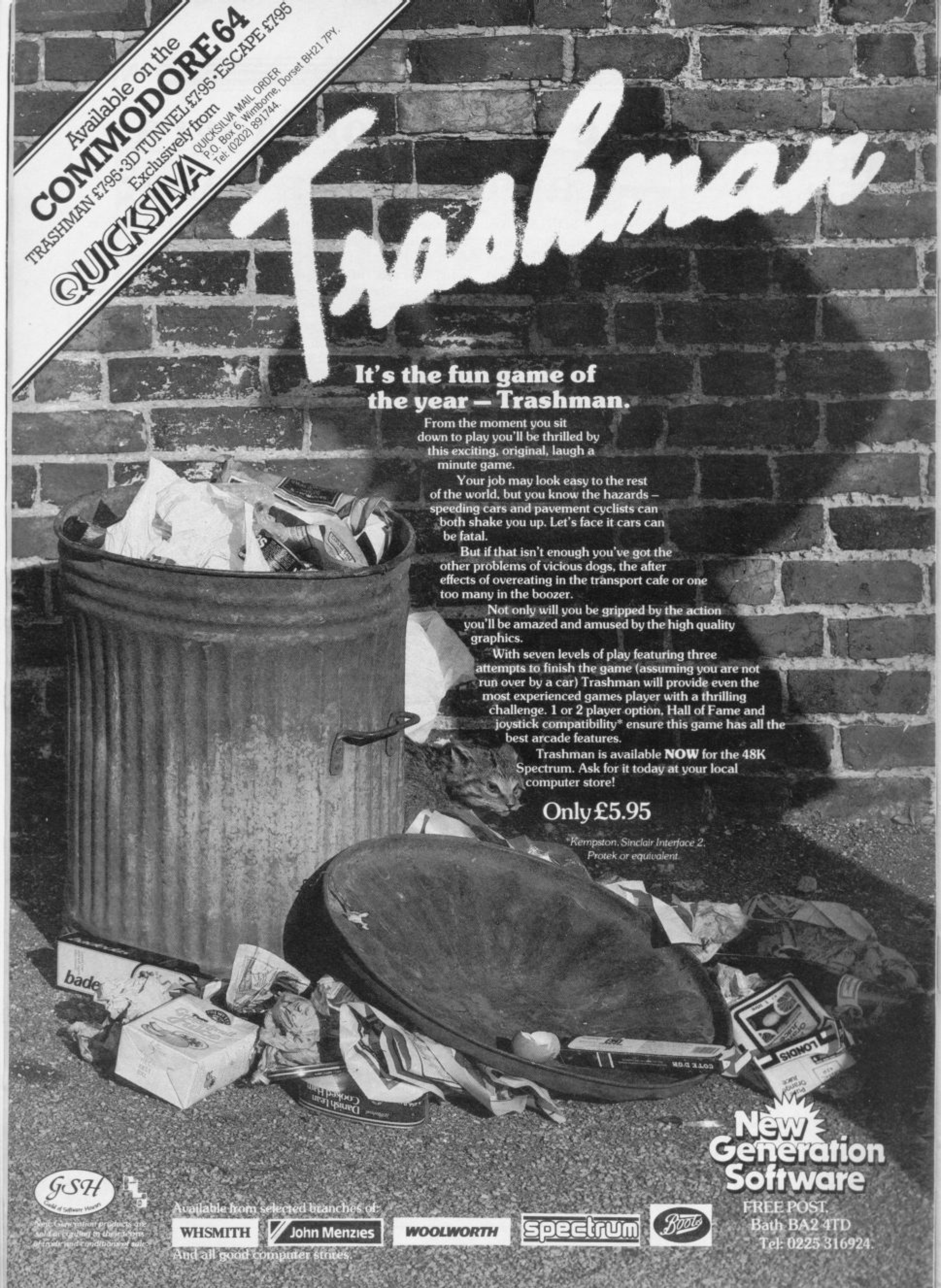
Topo is toppled

TOPO, the American personal robot, will no longer be exported to Britain. Androbot, which makes the robot, has also announced the shelving of plans to export two other robots. The company is said to have experienced difficulty in raising production to the required levels for overseas distribution.

U.K. distributor Prism is negotiating for the rights to manufacture the robots under licence but no decision has yet been taken. Prism hopes Androbot will not be halting exports of Topo permanently; a spokesman for the company says:

"We hope to be able to accept deliveries from January, or to be in a position to start our own manufacture."

more news on page 15



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Londoners win Jet Set competition

THE PRIZE for the first person to complete Jet Set Willy, the smash hit arcade game from Software Projects, was won by two Londoners, Ross Holman and Cameron Else. The competition involved discovering the number of objects in Willy's mansion and both winners collected all 83 items and returned successfully to the Master Bedroom.

The winners are to receive a case of champagne and a helicopter ride over London. The helicopter is to be piloted by Tommy Barton, a director of Software Projects.

Another competition winner is Michael Wood of Exeter, who won a QL for surviving for an hour at the final level of Psytron, by Beyond Software. Psytron is reviewed elsewhere in this issue. A spokesman for Beyond was not clear as to which model QL would be awarded as the prize but said: "We have a QL in the office . . . definitely . . somewhere."

QLs delivered on time says Sinclair Research

IT SEEMS that production of the QL is now up and running with delivery dates to customers fulfilled, despite initial hiccups. Another version of the machine to be shipped to the ever-patient public no longer has the external EPROM hanging from the back — it has been incorporated in the main casing.

The bugs present in the first machines have, according to Sinclair spokesman Bill Nichols, been eliminated. They included the tendency of the software to crash and the slow loading time of the Microdrives.

The final version of the QL, with the internal EPROM replaced by ROMs, was due to appear towards the end of July.

Nichols would not indicate the exact number of QLs shipped to date but said Sinclair Research is on schedule to supply the first 13,000 customers by the promised August delivery dates.

The completed manuals have also been delivered, though the ones received at the *Sinclair User* offices were far from being error-free.

With QL problems now, it is hoped, a thing of the past, the stage is set for Sir Clive to attempt to topple Acorn from its enviable position in schools and colleges and, in the States, to recapture the market lost by the withdrawal of Timex earlier this year.

Software house threaten to boycott magazines

RUSHING IN where angels fear to tread, software house PSS has joined forces with other companies in a desperate attempt to persuade computer publishers to act as policemen in the increasingly murky battleground of software piracy. The group, which includes CRL, Anirog, Silversoft, Interceptor, Microdeal and Visions, has threatened "withdrawal of all advertising support from any journal carrying advertisements for tape and disc copiers".

PSS director Gary Mays acknowledges that such products are not illegal but nevertheless feels they should not be advertised. I recognise there is a need for making back-up copies in some instances but unfortunately we are running a business and if piracy continues to increase we will be unable to survive. The end result will be that the consumer gets nothing."

John Ross, group advertisement manager of *Sinclair User,* comments: "It is a decision of the individual software companies as to whether they advertise in any magazine they choose. *Sinclair User* will continue to offer a complete service to its readers and in doing so will publish any advertisements which are not offensive or illegal."

Game of the book

MOSAIC PUBLISHING has launched a new range of products which it calls bookware. Each of the packages contains a novel or a short story by a famous science fiction author, together with adventure games which have been written around the themes of the books.

First to receive the treatment is **The Stainless Steel Rat,** by Harry Harrison. The package is unusual, as Harrison co-wrote the software with programmer Sean O'Connell.

The game has three sections in which you are tested on your eligibility to join the Special Corps, try to escape in your spaceship and explore the planet Freibur. The book and cassette package cost £14.95.

Also included in the range are **The Width of the World,** from a short story by Ian Watson; **Inrock,** a game featuring the fantasy world of the same name from a book by Desmond Morris; and **The Saga of Eric the Viking,** which has been culled from the children's book about the 'land where the sun goes at night' by Monty Python star Terry Jones.

More information about all bookware titles can be obtained from John Wiley and Sons Ltd, Baffins Lane, Chichester, Sussex PO19 1UD.

Spectrum super-heroes

ADVENTURE International, a company headed by Scott Adams, founder of adventure gaming on microcomputers, has launched a new series of games based on Marvel Comics super-heroes.

The first game to be released features the Hulk in an adventure called **Questprobe.** Marvel has produced a comic of the same name which will include the storyline of the game.

Similarly packaged adventures will be released soon, including comic book characters such as Doctor Strange, Nightmare and Ant-man. They will be available on the 48K Spectrum as well as the BBC micro, Atari, Commodore and Tandy machines.



Your games in print

NEWTECH Publishing has launched a competition to find puzzles and computer games for a new book, *The Times Book of Computer Puzzles and Games.* Entries must be in by July 31 and must either be games or puzzles written in Basic for the Spectrum or Commodore 64.

The two top prizewinners will each receive an Epson HX-20 portable computer. The five runners-up will be awarded Maplin Electronics modems.

The authors of each game published in the book will receive a W H Smith gift voucher, worth £10.

More information can be obtained from The Times Book of Computer Puzzles and Games, c/o Newtech Publishing Ltd, 8 Forge Court, Reading Road, Yateley, Camberley, Surrey GU17 7RX.

Business as usual in Quicksilva takeover

QUICKSILVA, one of the first companies to enter the Sinclair software market, has been acquired by the Argus Press group, the publishing and communications arm of British Electric Traction. Argus says there will be no changes in the marketing strategy or staffing of Quicksilva or its American counterpart, Quicksilva Inc. Jim Connell, chief executive of Argus magazines division, says:

"Quicksilva has established itself rapidly as one of the leading software companies in the U.K. and this investment furthers our expansion in the software market. I am delighted that Rod Cousens will be continuing in his role of managing director of the company to mastermind the expansion."

The financial expansion of Quicksilva will mean that the company will be able to accelerate its activities and diversify into new technological areas. The company plans to invest heavily to produce the next generation of computer games and applications.

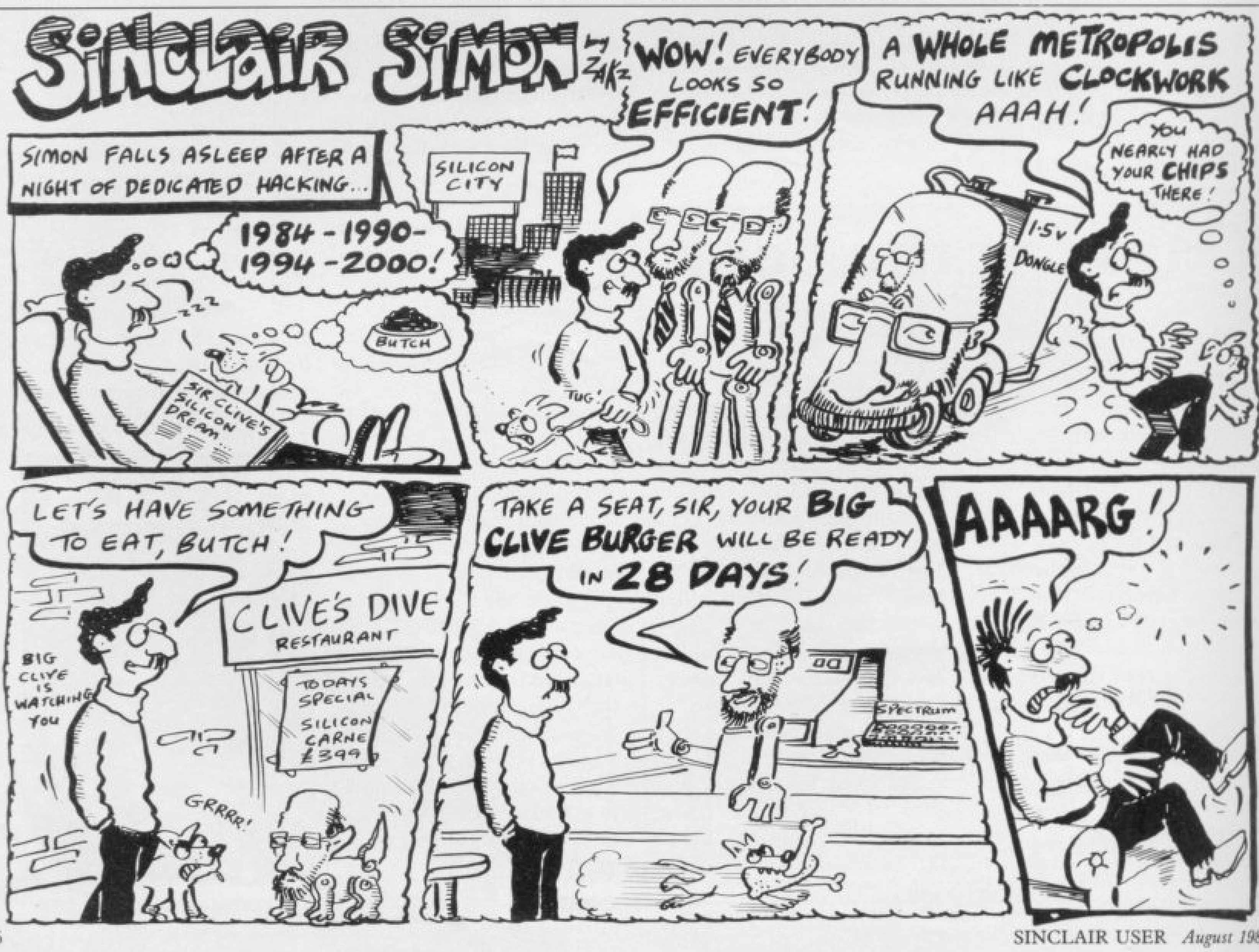
Cousens is pleased with the way the company is heading. He says: "I look forward to working with a new board of directors committed to the continued growth of Quicksilva. It marks a new era for the company. We are confident, enthusiastic and excited at the prospect of future developments which will enable us to maintain our position of prominence in the market."

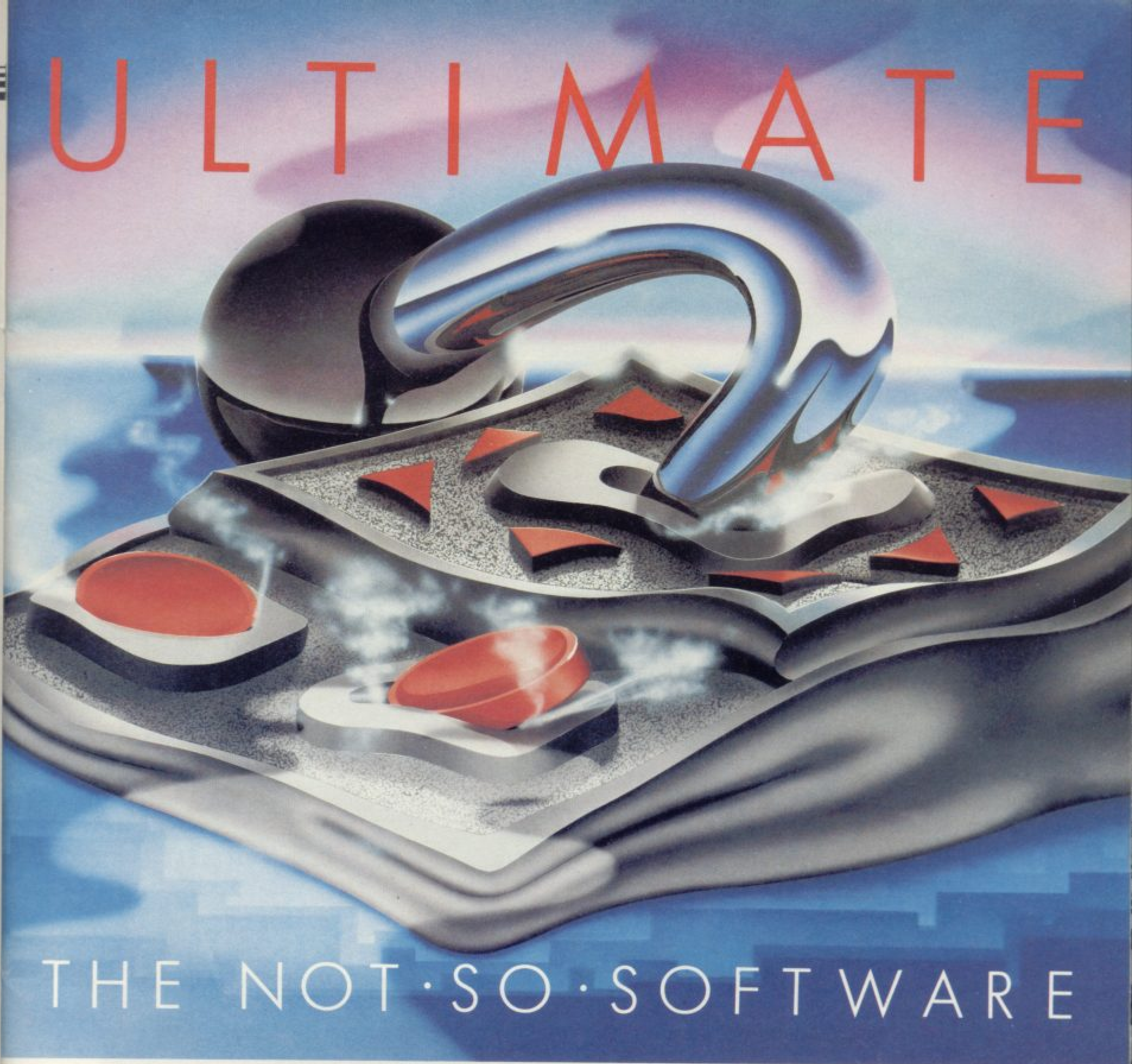
Leader of the pack

SINCLAIR RESEARCH still led the British computer market with 43 percent of sales in the first quarter of 1984. A survey, conducted by Audit of Great Britain, put total sales in that period at 215,000.

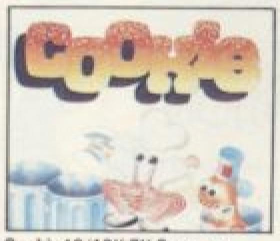
Commodore Business Machines has a 28 percent share of the U.K. market but leads in world sales, almost double those of Sinclair.

Another survey, by Cunnington and Associates, indicates that there were 2.2 million computers in British homes. Forty-four percent of children aged between 12 and 15, and 14 percent of the population, now live in a home with a computer in it.





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Politics in perspective

AS A SUBSCRIBER to your magazine I have found it interesting and informative, including the articles, advertisements and letters from other readers. I am very concerned about a letter included in the June issue. The daily and local newspapers are full of letters expounding ill-informed political views and I was surprised that such a letter should appear in your magazine.

I hope in the future you restrict the letters you publish to technical and commercial issues and leave the political rubbish to the newspapers.

B Lichtman,
London N14.

I FELT bound to write to reply to the inaccurate letter which appeared in June *Sinclair User* from J R Murray-Bligh.

The present Government attitude to education is appalling. It has done less than any previous Government in history to bring teachers' pay into line with inflation which Murray-Bligh does not bring to the fore. Instead of concentrating on the majority of students, which most sensible governments would do it, it favours private and grammar school education — the elite few. That is also true where computers are concerned.

Instead of incorporating them within subjects to use in conjunction with what should be much better teaching facilities, the Government runs specific courses for those showing a high mathematical ability. There is very little done to make real use of them, i.e., helping to "sell" the particular subject to the majority of pupils.

I therefore conclude that the present Government's attitude to the role of computers in education is open to much and very justified criticism.

I am very impressed by the high standard set by your magazine, embodied in the excellent and varied articles run on a regular basis. Keep up the good work.

Paul Barker,
Solihull,
West Midlands.

Secrets of the Alchemist

AFTER READING all the letters printed in *Sinclair User* about different topics I thought I would write and say that I have completed The Alchemist after days of hard thinking. To help other readers I have stated some clues to try and help those who cannot defeat the Evil Warlock.

They are: the chest leads to the scroll of destiny; the restore spell should be used a lot; use the lead, lamp, ring and vase wisely; and finally the lead, the transform spell and the chest turn to gold.

Mark Sharry,
aged 14,
Edinburgh.

Pensioner wins pools

ONE OF the main points you stress in User of the Month is the age of the person you are interviewing. So it may interest you to learn that I am nearly 72 and have been pounding a computer for just a year. This leads me to pose you a question. Can I qualify for being the oldest Spectrum user and owner? Can anyone else lay claim to that title?

Six months after buying my machine I composed my first program, a Pools Forecaster. It rewarded me by winning more than £200 and since then I have had several small wins, so you know why my face is aglow when I speak to people about buying a Spectrum.

Charlie Fowler,
Sheffield.

Incompatible interfaces

I WOULD like to inform readers of an incompatibility between the Sinclair Interface One/Microdrive and the Kempston E interface. The Kempston interface apparently intercepts the messages from computer to Microdrive and vice versa and changes the information, thus causing a "Hook code error".

Unfortunately the method is used by the excellent Campbell Systems Masterfile. I contacted Campbell Systems and I was told that the error was caused by a fault in the Kempston interface EPROM. Kempston has now offered to fit a switch to rectify the fault. I hope that my experience will help other Spectrum users with an Interface One.

M A Burley,
Driffield, E Yorks.

Readers and their robots

I FIND *Sinclair User* of a most high quality but even so I think it could be improved with regular articles on robotics. I am sure that there are many people who are interested in this field of computers and articles with simple projects such as building simple robots and buggies would be very helpful.

If there is no room to print such an item at the present time, could you please send me details of where to get information on robotics and the like? I hope that you will take the suggestion into consideration.

C Walford,
Yeovil, Somerset,

● *Perhaps you should read our sister magazine,* Practical Robotics. *It is published every other month and is available from newsagents or direct from ECC Publications, 196-200 Balls Pond Road, London N1 4AQ.*

Rainbow retaliates

I REFER to the review of the Rainbow Electronics Spectrum programmable joystick interface in Hardware World in the June issue. While we may no doubt be accused of bias, I do, perhaps inevitably, disagree with almost all the points made in it.

I am glad that the review made the point that the interface is competitively priced at £24, since to have a sound boost at the same price as similar interfaces without it must be excellent value.

It is true that a few people have found the interface difficult to program but the vast majority have found the opposite, even with only two hands rather than the three your reviewer suggested it was necessary to have.

In reply to the point that the product could have been better made, it happened that *Sinclair User* had the very first interface to leave the premises and a few modifications and improvements have been made since that time.

We have had few interfaces returned and those despatched in the first days of production are still working satisfactorily. The few which have been returned have been repaired when necessary and sent back promptly.

I believe that we have an excellent product and, while I am sorry that all do not agree, I am glad that most do.

Dorian Ferdinando,
Rainbow Electronics,
South Leigh,
Witney, Oxon.

more letters on page 23

Keeping up with the times

I HAVE enjoyed *Sinclair User* for some time and may well continue to subscribe to it but it has now reached the point that mentally I knock six weeks to two months off the current date before reading a news item.

Two instances may be enough to show you what I mean. The issue I received about two weeks after the QL announcement did not mention it. Worse, you featured an article saying the Timex marketing of the U.S. version of the Spectrum was going well. Your article was published weeks after Timex had announced its withdrawal from that market and after Uncle Nigel had flown to the U.S. to try to pick up the bits. You have bruised your credibility — a priceless business asset but only if you can demonstrate that you value it.

The daily press presents news of yesterday and the day before. With a little effort, the monthly press — even if it follows the deplorable practice of dating its issues with the month after publication, purely because its lesser competitors do so — should be able to feature important items two weeks old.

Peter Morley,
High Leigh,
Cheshire.

● *Printing of* Sinclair User *begins three weeks before it arrives on the street to allow time for distribution. Consequently our news items are, despite our best efforts, sometimes outdated by subsequent events. The Timex story in issue 25 is one example. The alternative would be to print no news stories but we feel that would be depriving readers of a useful information service.*

You are, however, mistaken about the QL announcement. Less than a week after the new computer was launched on January 12, our February issue appeared with news of the announcement. The story was written before the launch when Sinclair Research was able to confirm that the QL was about to appear. Sinclair User *was one of the first computer publications, weeklies included, to publish the story.*

Sinclair in translation

I AM awaiting delivery of a QL. The intention is to use it as the basis for full-time home employment, utilising my knowledge of Russian and Polish languages. Initially, I have in mind two applications. They are transcription of foreign language dictionaries from printed book format to a computer-based referral system and translation of Russian journals and periodicals, supplying the results to a computer-based information provider.

Any assistance and advice would be invaluable. In particular, how to use QL-based equipment for my purpose, addresses of publishers and information providers; details of subscription fees, who to contact and which modem facilities I should have are, of course, also desirable.

K M Jones,
Eastbourne.

Wanted: girl, own Spectrum

I WANT to ask why the special offers in your magazine always are for U.K. readers only?

I am looking for a pen girl friend with whom I can swap ideas and programs. I am ready to make contact with any girl, wherever she may be in the world. She has only to own a Spectrum.

De Keuleneire Danny,
aged 19,
Dorp 23d 9298 Wichelen
East Flanders, Belgium.

● *The reason many of our offers apply only to U.K. readers is because we cannot calculate a list of prices applicable to all overseas customers. Enquiries from such customers are welcome and we will try to calculate prices on individual items.*

Star gazers are insulted

I WOULD bring to your notice an error of serious consequence in the May issue of *Sinclair User.*

In the review of ZX-81 software — Blast from the Past — you describe the program Ephemeris by Bridge Software as "an astrology program" and repeat the error later.

Astrology pertains to the doubtful practice of fortune-telling and I would suggest that most of the people partaking thereof would not know the difference between sideneal time and lunchtime.

I suggest that you apologise to all astronomers who may read your magazine, as I have no doubt that they will feel insulted by being coupled with those addicts of the Zodiac.

F L Harland,
Manchester.

Quick-change graphics

ON TYPING in and running one of your reader's programs which had two sets of user-defined graphics, I found the delay in the graphics exchange made the program slow and annoying. The reader used RESTORE and two sets of DATA statements with a FOR . . . NEXT loop with READ and POKE in the loop. That used a good deal of space and you could soon run out of memory with a 16K Spectrum.

I have designed a small machine code routine which makes the transfer of two sets of graphics almost instantaneous. To work it, type in the program from list one and RUN it, then DELETE the lines from list one. Do not NEW the program. You can then make your own first set of UDGs or load them from tape. Next test your graphics and when you are satisfied type RANDOMISE USR 32300; you will find your first set of graphics has disappeared. At this stage it is advisable to save the graphics and the M/CODE by SAVE graphics CODE 32300, 201 You can then make your second set of graphics; when they are correct you can either save them by the usual method, i.e., SAVE GRAPHICS CODE USR "A" 168 or you can save the lot with SAVE "GRAPHICS" CODE 32300,467.

LIST ONE

```
   1 CLEAR 32299
   2 REM M/CODE FOR UDG TRANSFER
   3 REM
  10 FOR A=32300 TO 32332
  20 READ B
  30 POKE A,B
  40 NEXT A
  50 DATA 197,229,213,245,42,123,92,17,77,126,6,168,126,245,26,119,241,18,35,19,5,120,254,0,40,2,24,240,241,209,225,193,201
```

You then have two "pages" of UDGs which you can switch from within a Basic program by using the command RANDOMISE USR 32300.

LIST TWO

```
  10 REM ORG    #7E2C
  20 REM
  30 REM PUSH   BC  ;STORE ALL
  40 REM PUSH   HL  ;REGISTERS
  50 REM PUSH   DE  ;USED
  60 REM PUSH   AF
  70 REM LD     HL,(#5C7B) ;UDG
  80 REM LD     DE,#7E4D  ;STORE
  90 REM LD     B,168  ;COUNT
 100 REM LOOP  ****
 110 REM LD     A,(HL)
 120 REM PUSH   AF
 130 REM LD     A,(DE)
 140 REM LD     (HL),A
 150 REM POP    AF
 160 REM LD     (DE),A
 170 REM INC    HL
 180 REM INC    DE
 190 REM DEC    B
 200 REM LD     A,B
 210 REM CP     0
 220 REM JR     Z,DONE
 230 REM JR     LOOP
 240 REM DONE  ****
 250 REM POP    AF
 260 REM POP    DE
 270 REM POP    HL
 280 REM POP    BC
 290 REM RET
```

I include an assembler listing for a 48K machine.

M D Wood,
Larkfield, Kent.

more letters on page 24

Hints for Jet Setters

OUR THANKS to all who have sent letters revealing hints and tips for Jet Set Willy from Software Projects. First, infinite lives. To obtain immortality, load the program with MERGE "", stop the tape, and ENTER: 37 POKE 35899,0. Then ENTER: GOTO 10 and re-start the tape. L Griffiths of Merseyside, Ian Rogers of Wiltshire and David Pagett of Birmingham sent that tip.

Pagett also tells of a way of disabling the sprite graphics to render the mansion virtually trouble-free. Using the preceding method, add the line: 35 FOR F=40000 TO 40191: POKE F,0:NEXT F:FOR F=43780 TO 46595: POKE F,0:NEXT F:FOR F=46845 TO 49178:POKE F,0:NEXT F.

Jonathan Cheetham of Bristol discovered a means of gaining access to all rooms. First, guide Willy to the first landing and position him between the stairs and the entrance to 'To the Kitchens'. Then type WRITETYPER. Press key 9 and you should appear in the off-licence. Holding down combinations of keys 1-6 with key 9 should, according to Cheetham, transport you to other rooms. For example, 239 gets you to the entrance to Hades.

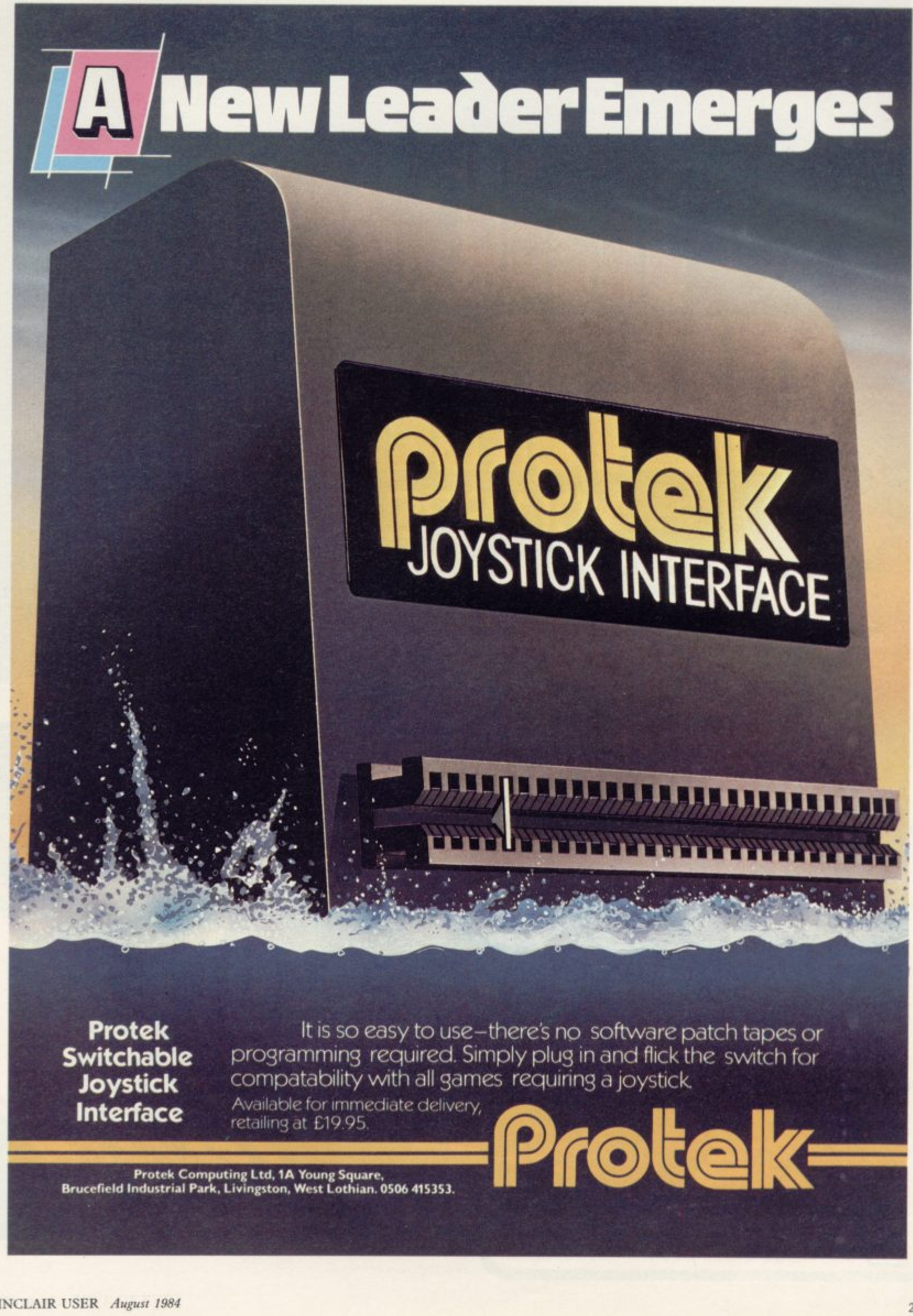
Neil Gore of Merseyside and Viv Shadbolt of Hertfordshire have both discovered the secret 'passages'. Try jumping off the Watchtower or rescuing Esmerelda to find yourself in the off-licence or Ball Room East respectively.

Finally, the last word should go to Software Projects. Now that the game has been won — see news story — the company has revealed a means of by-passing the so-called bug which involved instant death in several locations after visiting the Attic.

It was not a bug at all but a deliberate attempt to make the game even more difficult in the later stages. To negate the feature, load the first part of the program with MERGE "". Then ENTER: CLEAR 32767 and LOAD ""CODE. Start the tape. When the main program has loaded, ENTER: POKE 60231,0 POKE 42183,11 POKE 59901,82 and POKE 56876,4. To play the new version, ENTER: GOTO 40. To save the new version, ENTER: SAVE "JETSET" LINE 10 and SAVE "JSW" CODE 32768, 32768.

Gratitude is also due to Stephen Miles of Merseyside, Graham McMahon of Carnoustie and all others whose tips and advice we have been unable to print for lack of space. Their frenzied dedication to the great game humbles us all.




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Spectrum has good connections

CLASSIFIED Product Services has made its Spectrum flexible edge connector generally available. It is two Spectrum-style connectors joined by a piece of ribbon cable so that when you fit an add-on it will not suffer the same effect as the infamous ZX-81 RAM pack wobble.

The basic extender is supplied in either 2in. or 6in. lengths with a female connector at either end, into which slots a double-sided male connector. CPS also supplies an extender with an additional connector in the middle so that two dead-ended add-ons can be used at the same time, for example, printer and joystick interfaces.

At £8.50 for the two-way and £12.50 for the three-way extender, extra connectors can be added to order for £3 each. They will provide an invaluable addition for Spectrum users. Classified Product Services Ltd is at Shire Hall, The Sands, Appleby-in-Westmorland, Cumbria CA16 6XN. Tel: 0930-52204.

Touch of class

THE NEWEST keyboard on the market for the Spectrum is the Lo Profile from Advanced Memory Systems. It is visually a very attractive design and it will give your Spectrum a professional appearance.

Measuring 440 × 220 × 50mm. overall and 190mm. from the Q key to P, it has a sculptured keyset printed in three colours. The 155mm.-long space bar has a good levelling mechanism and there is a separate numeric keypad with an extra Caps Shift and full stop. The full stop and the extra Caps Lock on the main board still require a shift key to be pressed first. All the keys have a very good feel to them and the ENTER key is twice the size of the others.

The Spectrum PCB has to be removed from its case to be fitted and there are four bolts sticking up in the base for it. In the review model they did not line up correctly and had to be moved by enlarging the mounting holes slightly. The PCB is mount-



ed on those bolts, using plastic washers to protect it. While the base seems very flimsy, when everything is bolted together it is held securely.

PCBs are removed and used in the same manner as the normal two long screws — the interface is plugged in underneath the keyboard and bolted through. That raises it to a far more comfortable working angle.

As with all full-size working keyboards, fitting add-ons such as the Kempston printer interface is difficult due to its increased height at the back. The CPS connector would be a useful addition.

At £49.95 plus £2.50 p&p, the keyboard should sell well as it looks good and feels good. The addition of a few single-key entry functions would undoubtedly make it the best available. Advanced Memory Systems is at Green Lane, Appleton, Warrington WA4 5NG. Tel: 0925-62682.

Sweet chatter from Cheetah

THE SWEET TALKER speech synthesiser from Cheetah has been upgraded so that it will now work with Interface 1 and Microdrives.

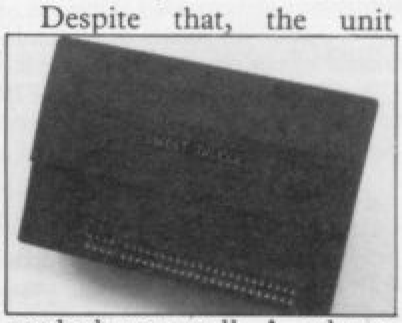
It uses the popular SP0256 speech chip which contains 64 allophones. An allophone is a sound from which all words are made. They are used by outputting a number to the unit which then 'speaks' the allophone.

In that way they can be strung together to form almost any word in, as the demonstration cassette shows, French, German and English.
cassette shows, French, German and English.

Unfortunately while the PCB has been upgraded the demonstration cassette has not. Users who have an Interface 1 attached will find the computer crashes when the program is RUN. To overcome that edit line 5010 to:

OUT 31,a:GOTO 5000.

Despite that, the unit



worked very well. A volume control would have been an added advantage but you cannot have everything.

For more details of the Sweet Talker, price £34.95, contact Cheetah Marketing Ltd, 24 Ray Street, London EC1R 3DJ. Tel: 01-278-6954.

more hardware on page 31

Mobile micro homes

THE Spectrum Console from Express Computers enables users who are usually surrounded by a mass of knitted wires and add-ons to put them together in one unit which can be moved about easily.

The unit has space for the computer, thermal printer, cassettes and player, joystick and other add-ons. There is plenty of space for all the wiring and it is drilled to accept a Masterplug. With that fitted you will have only one mains lead to plug in; it can be stored inside when not in use.

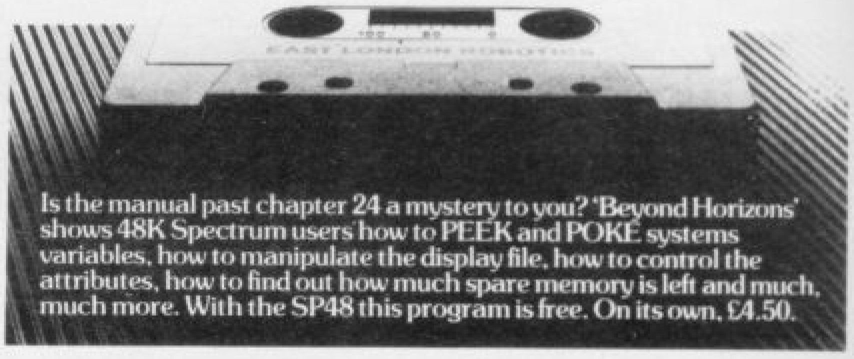
If you want to use an Interface 1 and Microdrive the instructions indicate where and how to make the necessary alterations. With add-ons you will need some form of flexible connector, like that from CPS, which is at least 6in. long.

At £34.95 the unit is, perhaps, rather expensive for the home user but should have many applications where ease of use and tidiness is important, as in schools and colleges. It is available from Express Computers (Rugby) Ltd, 83 High Street, Hillmorton, Rugby, Warwickshire CV21 4HD. Tel: 0788-71313 or from retailers.



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48/80 FORTH

This compiler and editor is fast becoming recognised as the most professional and highest quality implementation of the FORTH language on the Spectrum. FORTH gives you the speed of machine code without the tedium of machine-code programming.

All the Spectrum's excellent graphics commands are retained including DRAW, PLOT and CIRCLE. Real arcade quality sounds can be produced using BEEP.

More advanced FORTH programmers will find that 48/80 FORTH provides a complete implementation of FIG-FORTH, including the sophistications of BUILDS, DOES and CODE.

Each 48/80 FORTH cassette includes a separate FORTH editor which uses part of RAM as if it were disk. The 48K Spectrum allows a 16k RAM 'disk', while leaving nearly 20k of dictionary space. A comprehensive user-manual is also included, which covers both compiler and editor, and has a lucid beginners introduction.

Extensions to 48/80 FORTH will shortly be available to existing customers at a nominal charge. These will include floating point arithmetic, and microdrive handling.

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EAST LONDON ROBOTICS

Custom-built interface

ONE OF TWO programmable joystick interfaces for the Spectrum this month is from Custom Cable International, one of the backers of the Aquarius computer. The interface plugs into the back of the Spectrum and can accept any of the standard joysticks with an Atari-style plug. In common with many of the interfaces available there is no extender card on the back, so it must be the last add-on plugged in.

Programming the interface is very straightforward. A tape has to be loaded and that asks if you wish to program each of the four directions and fire, in order, and then asks you to press the necessary key — in all, 10 keypresses plus two to confirm that everything is in order.

The program, which takes only 15 seconds to load, is written entirely in Basic, which makes it very easy to customise for your use. The instructions, however, are sadly lacking in that respect.

It is a good interface and priced very competitively at £15. It is reasonably easy to program using the given system but it could have been better if a little more thought had been paid to the end-user.

Readers of *Sinclair User* may remember the light pen reviewed in the April issue. CCI has now taken over its marketing and has made three improvements. First, it now works — the review model defied all attempts. Second, it has the added facility to store screens in memory and to recall them, so that animated displays can be made; and, last, the price has been halved to £15. It is still not so accurate as it could be but it is adequate.

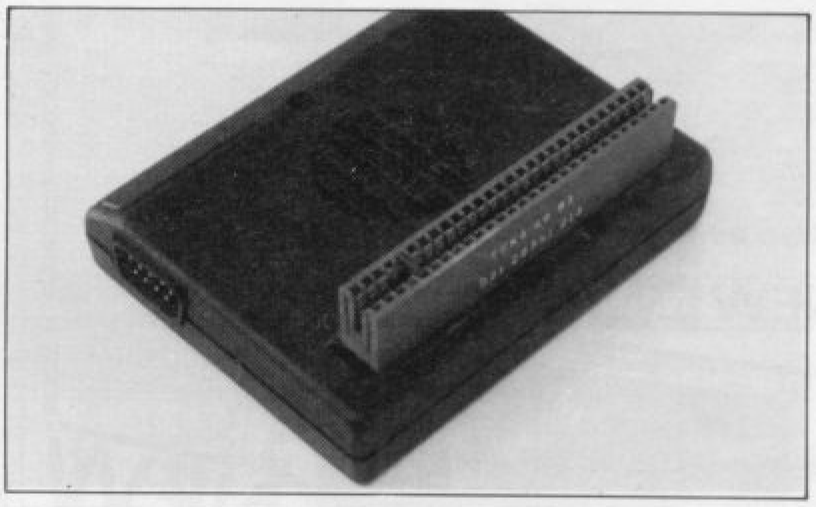
Custom Cables International Ltd is at Units 3 & 4, Shire Hill Industrial Estate, Saffron Walden, Essex.

Cheap and cheerful

THE NEW programmable joystick interface for the Spectrum from East London Robotics is the cheapest on the market at only £10 when bought with a Trick Stick. It was designed originally so that Trick Stick owners could use the stick on non-Kempston-compatible games but it also has an Atari-style socket for standard joysticks.

The interface is uncased. To program it, small metal clips are used to connect pins which represent the various rows and columns of the keys on the keyboard. That is very fiddly and time-consuming if you need to re-program it but it has the advantage that, once programmed, it is usable instantly from power-up.

If the interface is bought separately from the Trick Stick its price is £15. It is available by mail order from East London Robotics Ltd, Gate 1, Royal Albert Docks, London E11. Tel: 01-474-4430.



Centronics for QL

DESPITE QL delays, the add-on market is turning its attention towards the newcomer. The lack of a Centronics port is first under attack and one is now available from Miracle Systems.

It plugs into one of the two QL RS232 ports and can drive any standard Centronics printer. If you have an Interface 1, Miracle Systems has another interface which will fit to the RS232 port and can be upgraded later.

The interfaces cost £49. Miracle Systems is at 6 Armitage Way, Kings Hedges, Cambridge CM4 2UE.

Improved keyboard

DK'TRONICS has released yet another version of its popular keyboard for the Spectrum. Readers may remember that when we last reviewed its keyboard we bemoaned the lack of a full-size space bar and that is the main addition to it.

The other additions are that on the numeric pad the two shift keys have been replaced by single-key entry Delete and full stop. Note that in its current advertisement it still has the old legends on the keys.

A problem we encountered when fitting Interface 1 was that the back of the case bulged slightly and that is still so. While it is possible to trim the case it should not be necessary. One other niggle is that it is usual to have a space bar leveller, a small piece of wire which ensures the space bar remains horizontal when pressed, and that has been omitted.



Overall the keyboard is an improvement on the old version and is still one of the better ones available but dK'Tronics has been making keyboards for long enough to ensure that everything will fit properly. Also it has retained the stick-on legends which, while the keyboard was used for both the ZX-81 and Spectrum was understandable, is an unnecessary chore on a dedicated keyboard.

The keyboard is still sold at the old price of £45 from dK'Tronics, Unit 6, Shire Hill Industrial Estate, Saffron Walden, Essex CB11 3AQ. Tel: 0799-26350 or computer retailers.

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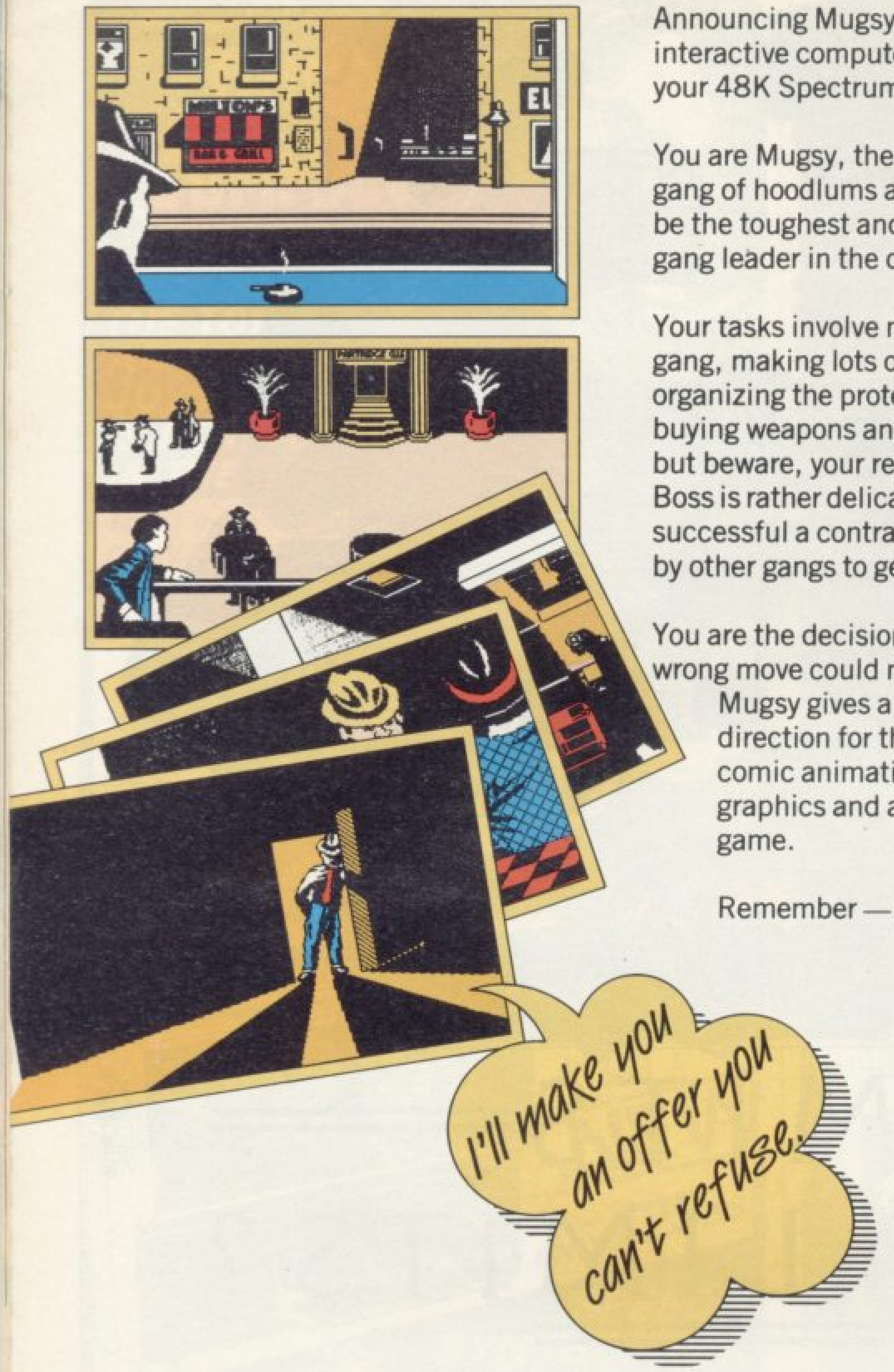
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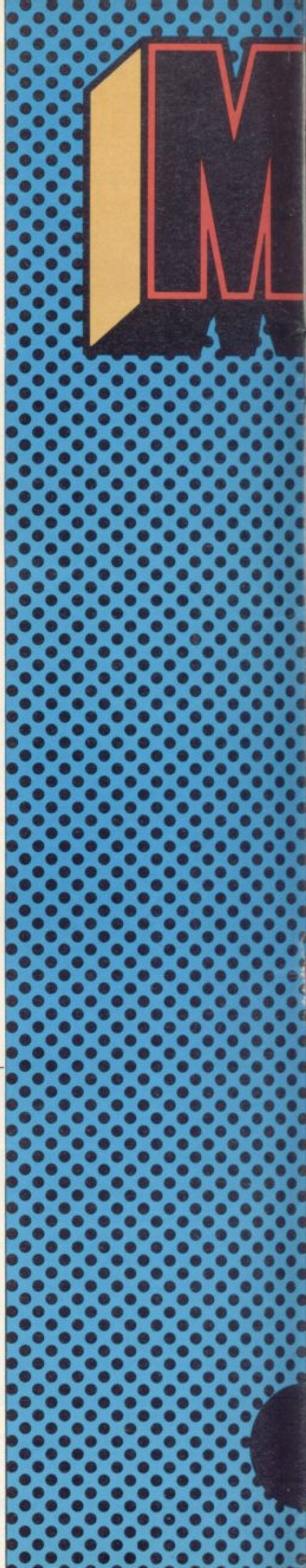
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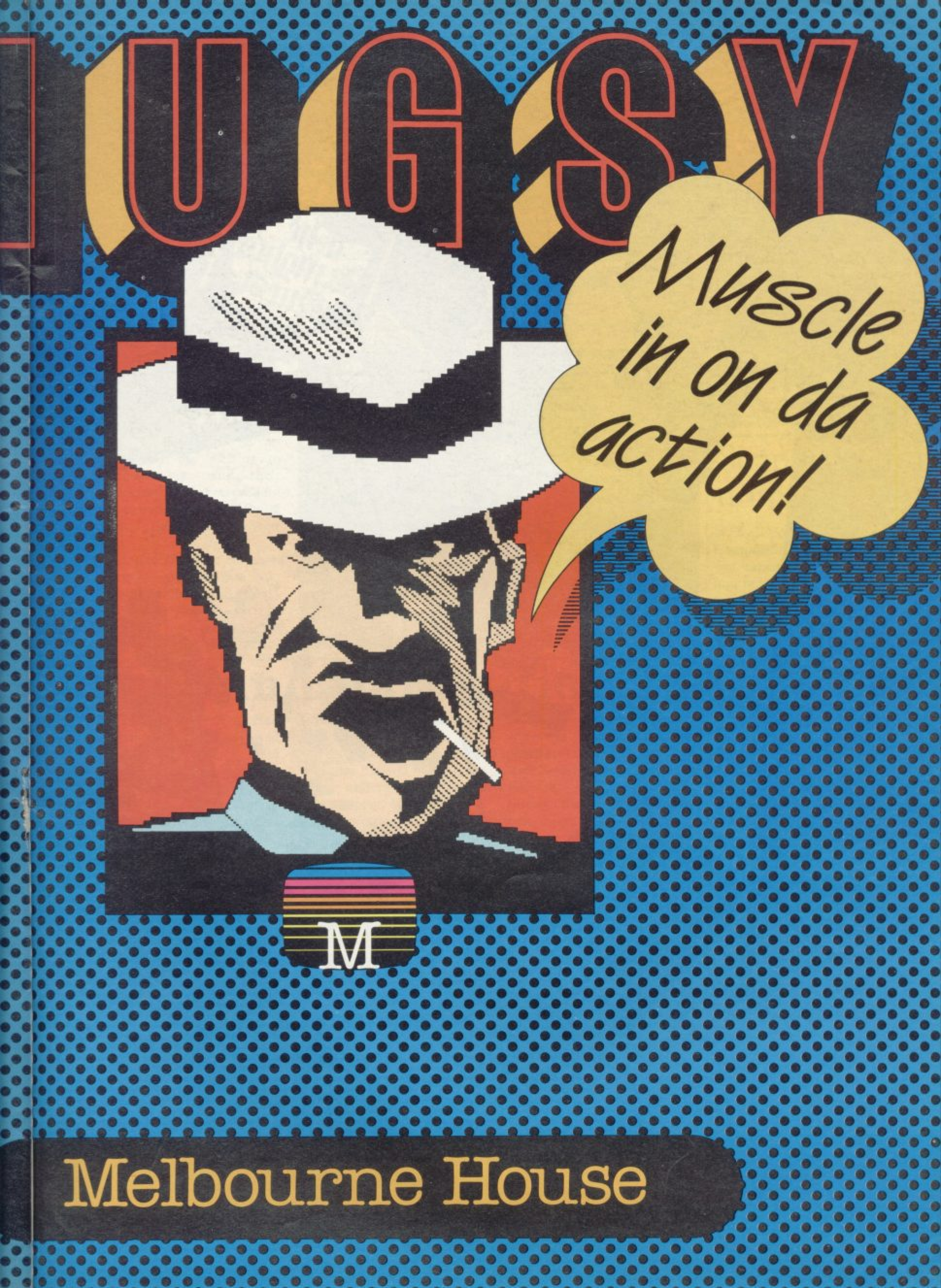
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Right track for Sinclair

THE EVIL Redmen have captured the ITA Express as it hurtles towards an unknown doom. As a special security agent you have to **Stop the Express** on your 48K Spectrum and round-up the Redmen before the train reaches the border, when they will be out of your jurisdiction and free.

There are two stages. In the first you have to run across the top of the train, jumping each carriage as you reach it. You must be careful, however, to avoid the attempts by the villains to eliminate you with their knives or fists. You should also beware of the low-flying electric pylons above your head.

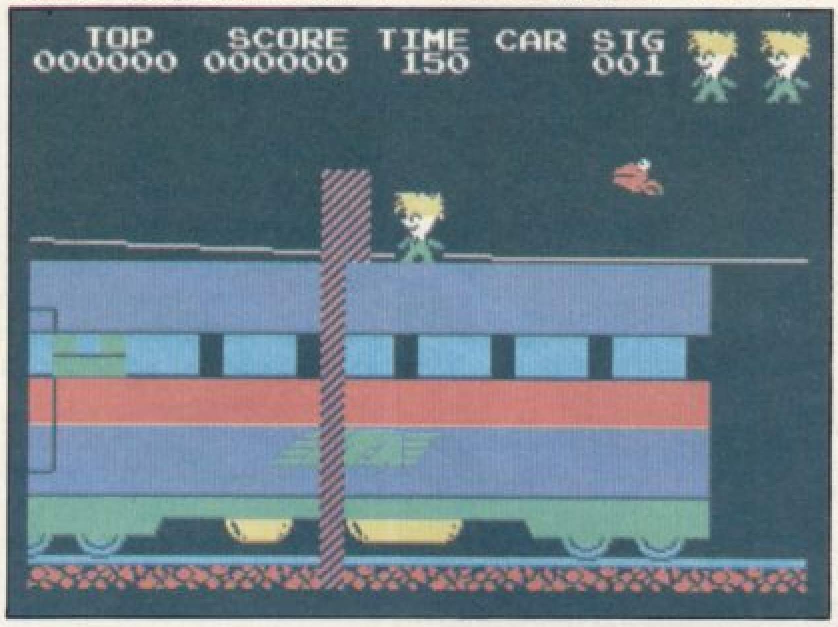
Despite the near impossibility of your mission you have one friend, the Snakebird, which you can catch as you travel over the carriages and release into the arms of the Redmen, who will suffer the same fate they had planned for you.

Once you have completed stage one you will be able to get inside the train, where Redmen and other assorted nasties will lunge at you, trying to shorten your life.

If you reach the end of the train, the express will start to slow and you will be congratulated on your efficiency as an agent. Then you are promptly dumped on top of the train again to run the gauntlet with more Redmen in the next round.

Stop the Express is well on its way to being a classic game. The idea is original and the graphics are of cartoon quality. It is also difficult enough to be addictive and, even when you have discovered the second level, you will want to keep playing.

Sinclair Research only occasionally releases a piece of software which establishes itself as an industry standard. This is one of those occasions.



STOP THE EXPRESS
Memory: **48K**
Price: **£5.95**
Joystick: **ZX Interface**
Gilbert Factor: **8**

Soap opera uninspired

WELCOME to the Artic Computing loopy laundry. If you expect to do any washing, however, you had better forget it unless you are very fast on your feet. **Mr Wong's Loopy Laundry**, for the 48K Spectrum, is too much like the last Artic game, Bear Bovver, to be a great step forward in games software.

The idea is to rush round the platforms and up the ladders, gathering clothes and depositing them down the chute at the top of the screen. Unfortunately there are soap suds, a giant iron and a dirty bag of laundry waiting to pounce on you if you cannot avoid them. You can turn the wayward washing utensils stiff by blasting starch in their direction, although you must be careful not to exhaust your supply of powder.

The game is good clean fun but is unlikely to be a best-seller. The graphics flicker and the actions you have to perform are repetitive. It might appeal to children but even they might be washboard-stiff after a time.

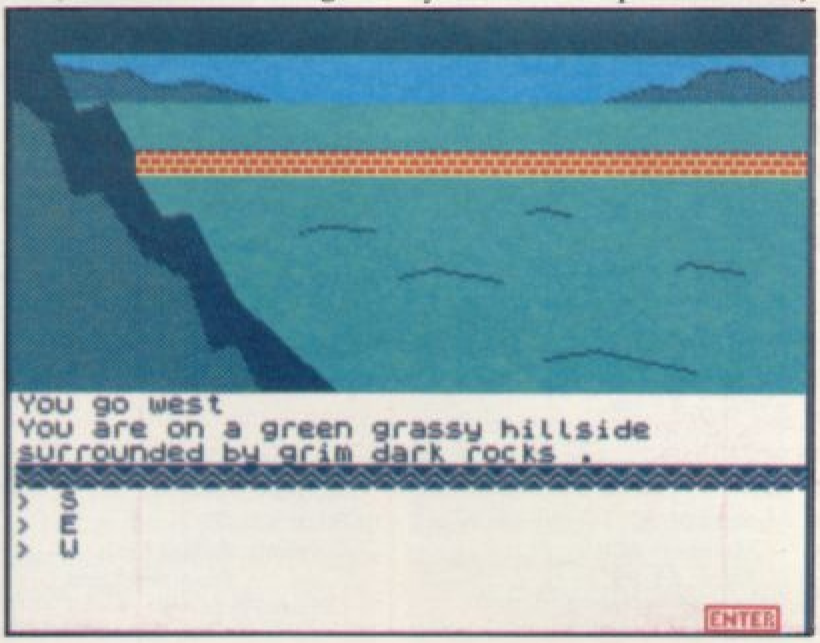
MR WONG'S LOOPY LAUNDRY
Memory: **16K/48K**
Price: **£6.95**
Joystick: **Cursor, Kempston, XZ Interface**
Gilbert Factor: **5**

Hell and damnation

IN THE fifth circle of Hell the damned stare glassy-eyed from the depths of gelid marches. Not in the imagination of the latest swords n' sorcery film director but in the great religious epic poem Inferno by 15th Century Italian poet Dante. Dante's symbolic world of hellfire and lost souls is the setting of **Inferno** from Richard Shepherd Software.

You take the role Dante wrote for himself — a pilgrim to the underworld, with the Roman poet Virgil as your guide. Inferno is a text adventure with graphics depicting each location, somewhat in the style of The Hobbit. As you travel deeper into Hell, you will meet the damned and the monsters which guard and torment them. You will have to find a way into the City of Dis and pass through the Forest of Despair before you finally reach your goal.

With such an imaginative idea for a game and the works of the great poet as a source of images it is a pity the graphics are not more inspiring. One can only assume that Richard Shepherd Software felt the true picture might be too horrific for gentle Spectrum owners. That said, the game moves at a fair pace and, although there are not so many problems to be solved as in some adventures, the atmosphere is maintained well and provides some compensation for a simple plot.



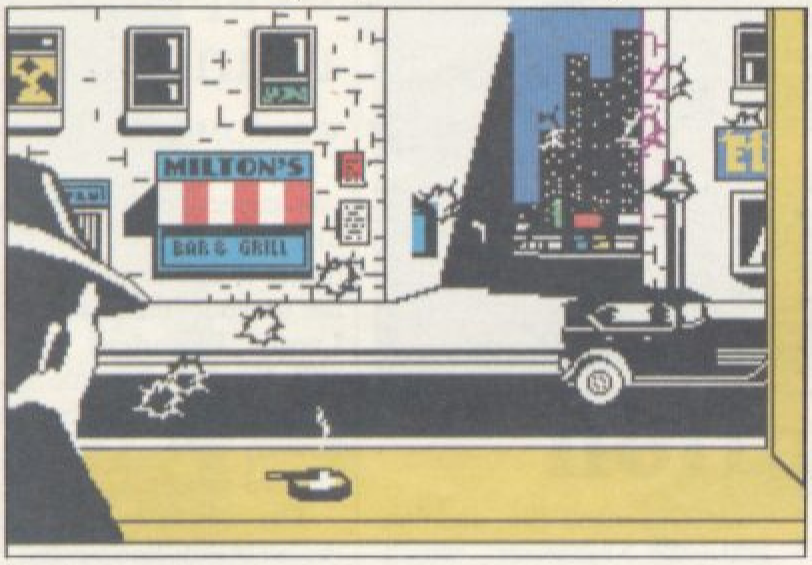
INFERNO
Memory: **48K**
Price: **£6.50**
Gilbert Factor: **7**

Pizza da action

IN THE DAYS of lead overcoats and concrete boots, when bootleg liquor cost blood and Bogart ruled the Bronx, there was one gangster whose exploits have until now remained obscure. His name was Mugsy.

In **Mugsy,** the new release from Melbourne House, you play the part of a gangland leader. The game requires you to make decisions as to how much money to extort from your protection rackets, what to set aside for bribery and how much to spend on arms for your underlings. Thus far the game is a moderately simple version of King, the land management game. Melbourne House has taken the concept and, by the use of extravagantly marvellous graphics, turned it into a minor masterpiece.

Each decision you make is portrayed in cartoon form, with the words in speech bubbles; a respectably large number of screens complement the story, in the style of old gangster movies. The pictures look to have been designed by a genuine artist and add immensely to the atmosphere of the game. At the end of each 'year' you also have an animated cartoon of an event during that year. There are only two of those short films but both are interesting to watch and they use the Spectrum graphics capacity to the full.



With so much visual display, the game must suffer from memory restrictions and there is not a great deal of variety in what happens from year to year compared to programs like Dictator by dK'Tronics. That said, Melbourne House has captured the atmosphere of old Hollywood movies so well that one tends to forget the limitations of the game and enter into the spirit happily.

Inevitably the graphics will tend to become uninteresting after they have been seen enough times but while they remain fresh they are a delight and make the game a pleasure to play.

MUGSY
Memory: **48K**
Price: **£6.95**
Gilbert Factor: **8**

Never mind the quality . . .

CUT-PRICE software inevitably begs the question of whether the games are any good. Mastertronic produces what, at £1.99, are the cheapest so far.

Gnasher is a Pac-Man derivative. The graphics are the conventional ones of maze, yellow Pac-Man and multicoloured ghosts. All the usual features are included — power pills, bonus fruit, two-player option and so on. The joystick response was slightly slow and sticky but if you must have Pac-Man in your lounge, you might as well save a few pounds and buy Gnasher.

Spectipede is rather more exhilarating to play, although that might reflect the virtues of the excellent arcade game Centipede rather than those of Mastertronic. Again, there is little of originality but the game is a fast version of the standard, with spiders, toadstools and multiple levels.

Also available is a darts simulation, **Bullseye.** The game is slow to play, much of it being written in Basic, and it is not very user-friendly, as it is possible to get into Basic by making a mistake when pressing the wrong keys.

That said, the game provides five versions of darts, including Cricket, 501 and Killer. There are also three ways of playing a shot; you can either state what you are aiming at, position a cursor on the appropriate part of the board, or enter the angle and distance of your shot.

The cover picture shows three dart-shaped spaceships homing-in on a red star. When you realise the nature of the game you can understand the point of the cover but it might well tempt the incautious lover of space games into buying something unwanted.

GNASHER
Memory: **16K**
Price: **£1.99**
Joystick: **Kempston**
Gilbert Factor: **4**

SPECTIPEDE
Memory: **16K**
Price: **£1.99**
Joystick: **Kempston**
Gilbert Factor: **5**

BULLSEYE
Memory: **48K**
Price: **£1.99**
Gilbert Factor: **4**

Ant and bee story

BORIS THE BEE, hero of the Bug-Byte Birds and the Bees, is back again and his wanderings have landed him into trouble with a nest of ants in which he is lost. **Antics,** also called Birds and the Bees Two, puts you in control of Barnaby, one of Boris' friends, who is out to rescue his mate. To do that he must move away from his hive and go down into the ants' nest.

All the action takes place underground, where a surprising number of flowers are growing in the nest. Do not question the logic of the ants' flower power, as the plants will give you pollen. If you have any pollen in your bags and an ant, or other creature, attacks you it will go for your pollen before making an attempt to take away your strength points.

When you get into the next you may find your path blocked by green walls. Skimming gently over the sides of the walls will reveal any secret passages there might be so that you can hover into the next compartment of the maze.

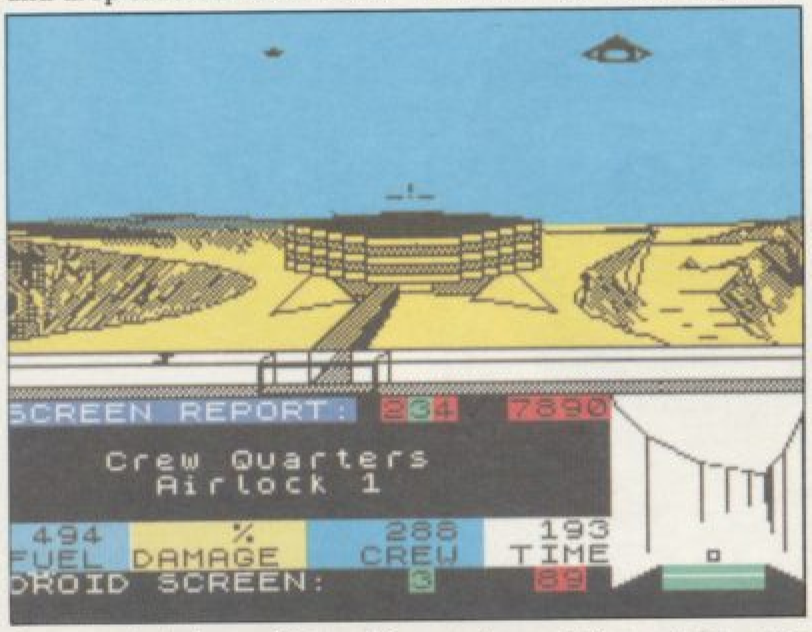
Antics is not so good as the standard of Birds and the Bees but it is an interesting maze game which does not suffer too much from sequel-mania where the author has repeated the same basic format but with new characters or more levels of difficulty.

It can be played equally well with keyboard or joystick, which is a change from the usual zap 'em arcade games which require a joystick to reach the higher levels. Antics is for the player who likes to consider what action to take before being blown to Hell.

ANTICS
Memory: **48K**
Price: **£5.50**
Joystick: **Kempston, Programmable**
Gilbert Factor: **8**

Beyond praise

ARCADE GAMES involving alien spaceships and destructive droids have taken another step forward with the release of **Psytron** by Beyond. The scenario is not startling — you have to defend a space colony against alien attack. The aliens try to bomb various installations and drop saboteur droids into the tunnels below which self-destruct when they reach their target.



What sets Psytron apart from the herd is its staggering complexity and extremely high-quality graphics. The game is played across 10 screens representing different areas of the colony and each picture can be called-up instantaneously. Beneath the view are status reports, including a continuous scrolling report simulating the kind of screen window associated with far more sophisticated machines than the Spectrum.

The first level may seem tedious. All you have to do is hunt the saboteur droids through the tunnels; when you have achieved a 50 percent score five times in a row the game allows you to continue to the next level, where you shoot at spaceships. More and more elements are included, until the final level arrives.

At that advanced stage not only do you have to keep zapping the aliens but you must also manage your crew numbers, deciding your defensive priorities to ensure the survival of the colony's buildings and the population. If the medical unit is destroyed your wounded will die; if the docking bay is damaged vital supplies may be lost.

Beyond is offering a Sinclair QL to anyone who can survive for an hour at the highest level. If anyone can, they might be better employed running the NATO central defence systems, or imprisoned forcibly as a potential danger to the public.

PSYTRON
Memory: **48K**
Price: **£7.95**
Joystick: **Kempston**
Gilbert Factor: **9**

Rugged graphics

YOU MUST be mad to carpet the floors of a local lord's manor, in **Carpet Capers** for the 48K Spectrum. The lord has also invited your rivals into the house to do as much of your work as possible and so take away money from you.

You score pounds for the amount of carpet you lay, and the number of rivals you carpet. You must also remember not to put carpet up to the doors for as any good fitter knows, you must not tread on newly-laid carpet.

There are nine rooms and it is best to use a joystick, as the action can be hair-raising. Unfortunately the same cannot be said of the graphics, which are amateurishly stiff in movement and are a character square wide.

Full marks, however, can be given for the concept which makes the game addicitive, perhaps even playable for more than half-an-hour.

CARPET CAPERS
Memory: **48K**
Price: **£5.95**
Joystick: **Programmable**
Gilbert Factor: **7**

Jungle Atac

HAVING thrilled gamers with the dusty attics and caverns of Atic-Atac, Ultimate has transported you to steaming jungles in its latest Arcade-Adventure, **Sabre Wulf.** The concept is similar to the earlier Atic-Atac. You must seek four parts of a hidden amulet to escape from the jungle maze; on the way you must battle a dazzling variety of foes, some weak and others seemingly invincible. There are numerous treasures to inflate your score, some of which may prove of use in the game.

The game is played over an enormous maze of jungle paths and clearings. Of the monsters, against which your only weapon is a sabre, we particularly liked the hippos, which charge down the corridors and must usually be dodged rather than skewered.

A major feature of Sabre Wulf are the various coloured orchids which, when eaten, have strange temporary effects on your abilities.

The disorientation orchid, which reverses all joystick controls, is particularly infuriating.



While the graphics are not entirely flicker-free, with the usual problems when figures pass over each other, they are up to the high Ultimate standards and the action is fast.

The main criticism of the game is price. Ultimate claims that is because of an increase in development time but the price still seems high. If the game is anything like as successful as previous releases, and it should be, we fail to see how Ultimate could avoid making a big profit even at the old figure of £5.50.

SABRE WULF
Memory: **48K**
Price: **£9.95**
Joystick: **Kempston, Cursor, Sinclair**
Gilbert Factor: **8**


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Geronimo's revenge

WITH THE rapid approach of school holidays, games software is in even greater demand. For those unfortunate people who are not visiting the sunny beaches there are still many games on the market for the 16K ZX-81.

The Siege of Fort Apache is a strategy game in which you take the role of a general with 300 men at his disposal. You must launch an attack on a fort in an attempt to destroy its walls and gain entry.

On each day of the siege you must assign your men to such tasks as building battering rams and ramps, manning cannons, collecting spare ammunition and fetching rations so that your troops can survive.

You must then decide your plan of attack. You can move in on the gate, try to bring down the walls or burrow your way underground. At the end of a day the computer will give you a status report on your situation, which includes how many casualties you have suffered and how many rations have been stolen.

If you lose more than half your troops during an encounter with the enemy you are outnumbered and lose the game. Your should keep an eye on the positioning of your soldiers, as you must leave sufficient men at your base camp to protect it from the enemy which may invade at any time. Another reason for keeping an eye on the troops is to make sure nobody deserts. If they have insufficient supplies your valiant men might do that.

Fort Apache has a simple presentation and lacks graphics. The range options and the results of the decisions you make in the game make it an absorbing strategy game, original and inventive in its use of subject.

The seige can be continued for several days if you keep your food supplies stocked and your men happy. You might also like to try to increase the life span of your armies through a series of games by trying various battle tactics.

The Siege of Fort Apache is produced by Contrast Software, Farnham Road, West Liss, Hampshire GU33 6JU. It costs £4.95.

Sinclair Research is retaining its collection of ZX-81 games tapes, the most recent of which are **Sabotage** and **City Patrol.**

Sabotage is a novel game in which you take the role of one of two people, either a saboteur or the guard protecting some highly-explosive material. If you choose to be the guard you must corner the saboteur before he can plant his bomb in a secret place. If you take the part of the saboteur you must plant your bomb without being caught.

Your score is determined depending on which role you



take. The guard's points decrease the longer he takes to reach the bomber. The saboteur scores his points by being destructive.

City Patrol is another destructive game, but in 3D. You take the part of a policeman moving round a city trying to destroy the alien invaders who try to raze tower blocks to the ground. At the very least you must prevent the destruction of as many skyscrapers as possible.

The 3D representation of the city is impressive, since producing 3D effects on the ZX-81 is difficult. Many hours of thought went into the screen display and, although the plot is a little weak, people who like out-of-the-ordinary games should be satisfied. Sabotage and City Patrol can be obtained from Sinclair Research or from some W H Smith and Boots.

FORT APACHE
Memory: **16K**
Price: **£3.95**
Gilbert Factor: **8**

SABOTAGE
Memory: **48K**
Price: **£4.99**
Gilbert Factor: **6**

CITY PATROL
Memory: **16K**
Price: **£4.99**
Gilbert Factor: **7**

Unicorn extinction

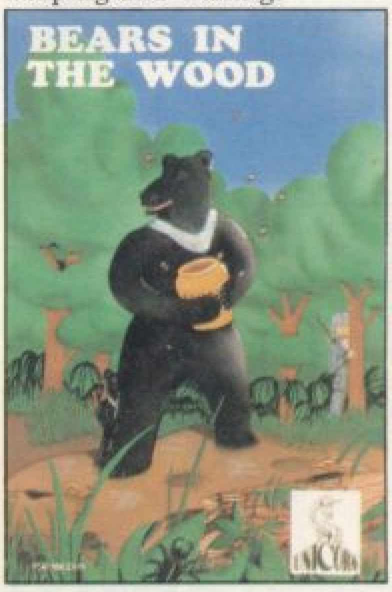
AT LAST, Eco-software for the ZX-81. Set in the Canadian wilderness, **Bears in the Wood** from Unicorn Micro Systems depicts the desperate day-to-day battle for survival of the great black grizzly bear which, according to the cassette inlay, has become endangered because its black coat was much desired by 19th century society.

It is your task to guide the mother bear and her three cubs to the safety of their cave, mauling on the way the hunters who wander the woods in search of stray cubs. Once in the cave the mother bear must fill the honey pots quickly with the honey she has collected from the woodland beehives before venturing again into the forest.

Points are awarded according to the time the bears survive and extra cubs can be gained by opening the door at the rear of the cave after filling all the pots. The game makes the most of what are essentially limited graphics—trees are represented by Ts and the hunters are no more than inverse Hs. The mother grizzly and her cubs in tow have more than a passing resemblance to a bug-eyed caterpillar, a far cry from the 'beautiful animal with amazing resourcefulness, strength and grace' described in the instruction.

Eating dots and negotiating mazes are nothing new to ZX-81 software but an element of tactical play is required, raising the program above the level of the simple arcade game. Experienced players, however, may find it easy to master.

The anonymous writer of the cassette insert injects a personal note when he writes: "These are the most beautiful of the bear species and I think it would be a great shame, a loss to the world, if they should never be seen in the forests again." Noble sentiments, certainly, but it is unlikely that the imminent extinction of a fuzzy blob by an inverse H will cause much weeping and wailing.



BEARS IN THE WOOD
Memory: **16K**
Price: **£3.95**
Gilbert Factor: **6**

CP software — Commodore 64 and Spectrum Programs

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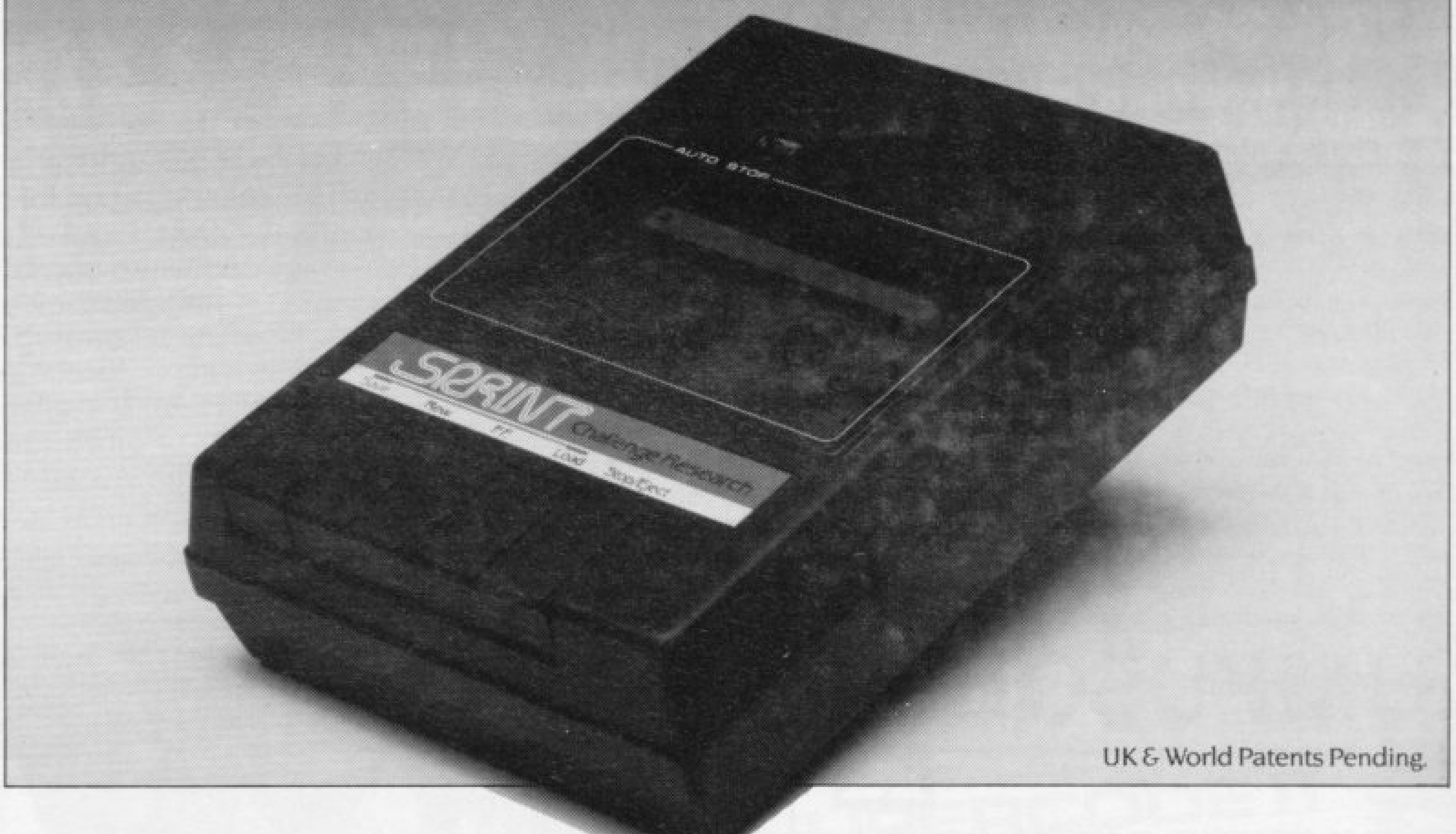
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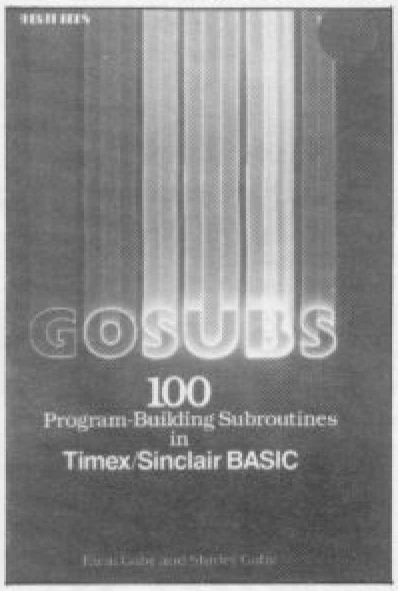
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SU8/84

GOSUBS makes for routine reading

IF YOU ever wanted to know about the nature of the Basic GOSUB command you might like to buy *GOSUBS — 100 Program-Building Subroutines in Timex/Sinclair Basic*. The title may be a mouthful but you are unlikely to find much of interest in the book, which seems to be just another excuse to compile a collection of listings.

The book might be of use to anyone who wants to build subroutines for calculating the area of a circle or find the mean, median and mode of a set of statistics, but those who are seeking something more light-hearted or which has more to do with computers will be disappointed.



Most of the subroutines could be written by beginners if they had the relevant rule books on geometry and calculus, as there is no fancy programming technique involved. They are uninteresting and, at times, trite. They are similar to examples given on O level exam papers.

The style revives memories of those dusty algebra books which still exist in some schools: "All football fields are 100 yards long. If the yards are converted to feet, the field can be said to be 300 feet long. The value of the length of the field has not changed but the form of the measurement has been converted from yards to feet . . . If, as some famous coach has said, "football is a game of inches, then it is a game of 3,600 inches."

In fact, all football fields are not 100 yards long, though they are in the States. That underlines the point that *GOSUBS* is an American book. Readers in the U.K. might be bewildered by programs headed 'Liquid English: Liter.'

As a collection of building block programs the book is moderately successful. It would have been more attractive to the novice if the monotonous text had been punctuated with comments from the authors.

If you like a staple diet of unpalatable listings and stodgy explanations you will enjoy *GOSUBS*. If not, you ought to steer clear of it.

GOSUBS
Price: **£7.95**
Publisher: **McGraw Hill**

May the Forth be with you

ADVANCED Spectrum Forth, from Melbourne House, has been launched to help people who have bought the company's Abersoft Forth package and do not know what to do with it.

The book, by Don Thomasson, shows the advanced aspects of the language but it is not only for the complete expert, as the title suggests. It offers explanations of the machine stacks and Forth words which the manual does not begin to cover.

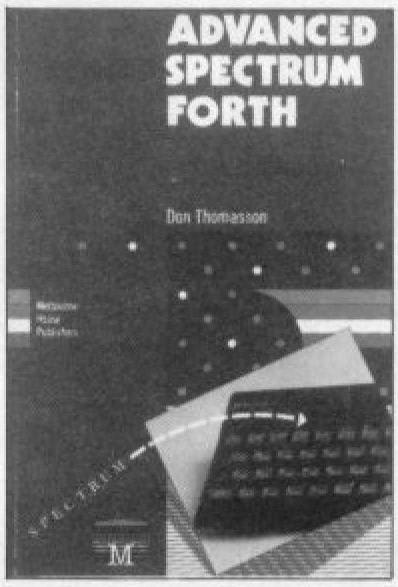
The first half is a re-run of the manual but is written in terms which mere mortals can understand. It also shows the difference between Spectrum Forth and the FIG standard. Those additions to the language are mostly for graphics and sound which, the author says, can be manipulated a great deal more easily in Forth than in Basic.

The second half of the book provides the real interest for people at advanced level. It shows how to structure programs using the screen editor and explains the difficult problem of SAVEing screens to tape.

The book also includes the use of assembly language and how to incorporate it in the structure of Forth programs.

Advanced Spectrum Forth is a guide which will benefit everyone who uses the language, not just enthusiasts for the Melbourne House version. The book is slim and also expensive but the author has fitted everything necessary between the covers by eliminating the waffle in which many experts indulge. The style is simple and the book should promote the cause of the Forth language.

ADVANCED SPECTRUM FORTH
Price: **£8.95**
Publisher: **Melbourne House**





Without waffle

ONE OF A SERIES of books aimed at beginners about specific computers is *I Wish I Knew about the Spectrum and the ZX-81*.

The information in it is very basic and the book reads like a hard-back version of Sinclair manuals. The first seven chapters explain how to plug-in your particular brand of computer to the mains and how to type in simple Basic programs.

It is only in chapter eight that things begin to be interesting, with an overview of the ways in which graphics are handled on the Spectrum and ZX-81. The relaxed style and copious diagrams make it an easy introduction to computing and suitable for adult and child alike. One of its most attractive features is the lack of the 'straight and dull' style so often adopted by manual writers.

Some readers might find the style too relaxed and, together with the shortage of text, finish the book in about half an hour. There are, on average, four paragraphs of large text on each page and generous amounts of white space. The question has to be asked why yet another beginner's book has been produced for two machines in a market which is already saturated? I wish I knew.

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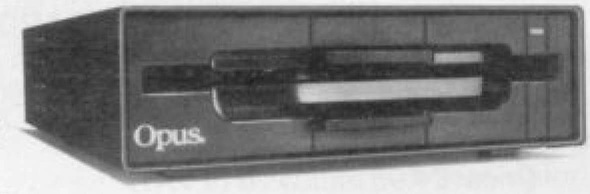
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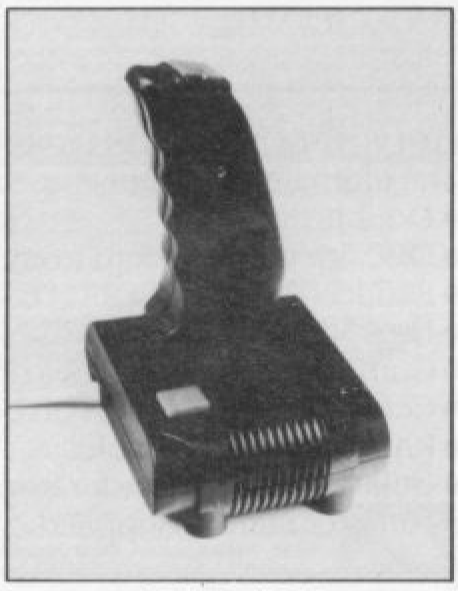
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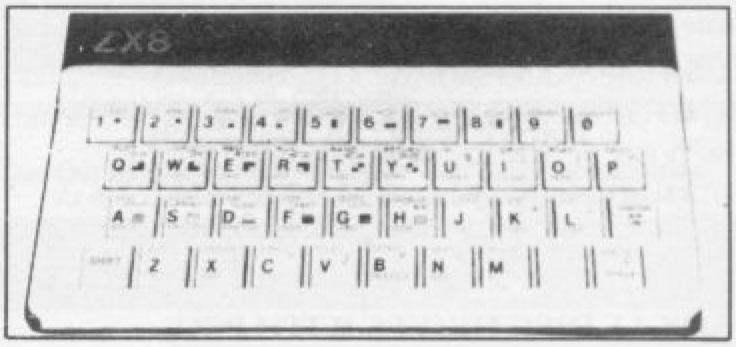


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LAST CHANCE TO ENTER

SINCLAIR USER and Cases Computer Simulations announce the 1984 Cambridge Awards for programming, the annual competition to find top programmers for Sinclair computers.

This year we are offering a first prize of £2,000 plus royalties to the programmer of the most innovative and appealing game for the Spectrum, ZX-81 or, in the unlikely event of anyone receiving one, the QL computer. The award winner will also be presented with the Cambridge Trophy for programming.

In addition to the first prize there are four second prizes of £250 each plus royalties and 25 runners-up prizes of five CCS programs. All prize-winners will receive a free annual subscription to *Sinclair User*.

We are looking for exciting programs which present the player with a challenge in decision-making and tactical play. Games which graphically depict real-life situations, such as piloting an aircraft or driving a motor vehicle, will also be considered, as will games which have a particular appeal for girls. The categories of programs which, therefore, can be submitted include adventure, strategy, simulation and war games.

Entries will be judged for originality and innovation, playability and addictive quality, graphics and the use which is made of the computer. The presentation of the instructions and the program documentation will also be taken into account.

The award will be judged by the same panel of experts who judged the 1983 Cambridge Awards — Mike Johnston, consultant editor of *Sinclair User* and organiser of the highly-successful and long-running ZX Microfairs; Trevor Toms, author of many best-selling Sinclair computer books; and John Gilbert, deputy editor of *Sinclair User*. A representative of Websters Software Ltd will also be on the panel, which will be chaired by Bill Scolding, editor of *Sinclair User*, and Melvin Lloyd-Jones, a director of CCS.

The presentations of the awards will take place on Thursday, October 4, 1984 at the Ritz Hotel, Piccadilly, London W1.

1984 CAMBRIDGE AWARDS ENTRY FORM

Title of game ....

Description of game ....

....

....

Machine: ZX-81/16K Spectrum/48K Spectrum/QL (delete as applicable)

I agree to abide by the rules of the competition.

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Send your entry to ECC Publications, 196-200 Balls Pond Road, London N1 4AQ to arrive not later than August 4, 1984.

Rules

- Entries must be on cassette accompanied by a listing, detailed explanation of the program and an entry form. The entry form is printed on this page of *Sinclair User*. Entrants must warrant that their programs are original.
- Only programs for the QL, Spectrum or ZX-81 will be considered.
- Entries must reach *Sinclair User* at 196-200 Balls Pond Road, London N1 4AQ not later than Wednesday, August 4.
- The entrant assigns CCS the exclusive licence with the right to sublicense, to copy, modify, sell and publish the original or modified program in any form and CCS undertakes to pay a royalty fee of 20 percent of the nett invoice price on the sale of such program(s) and further will pay a fee of £10 in respect of each publication of the respective program listing. CCS assigns ECC Publications the exclusive worldwide rights to publish the listings of all entries.
- The winning programs shall become the property of CCS, which undertakes to market the programs and to pay the winner a royalty and fees as detailed.
- The organisers retain the right to offer any entries for use by Micronet on an agreed royalty basis.
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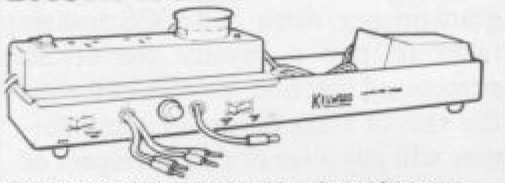


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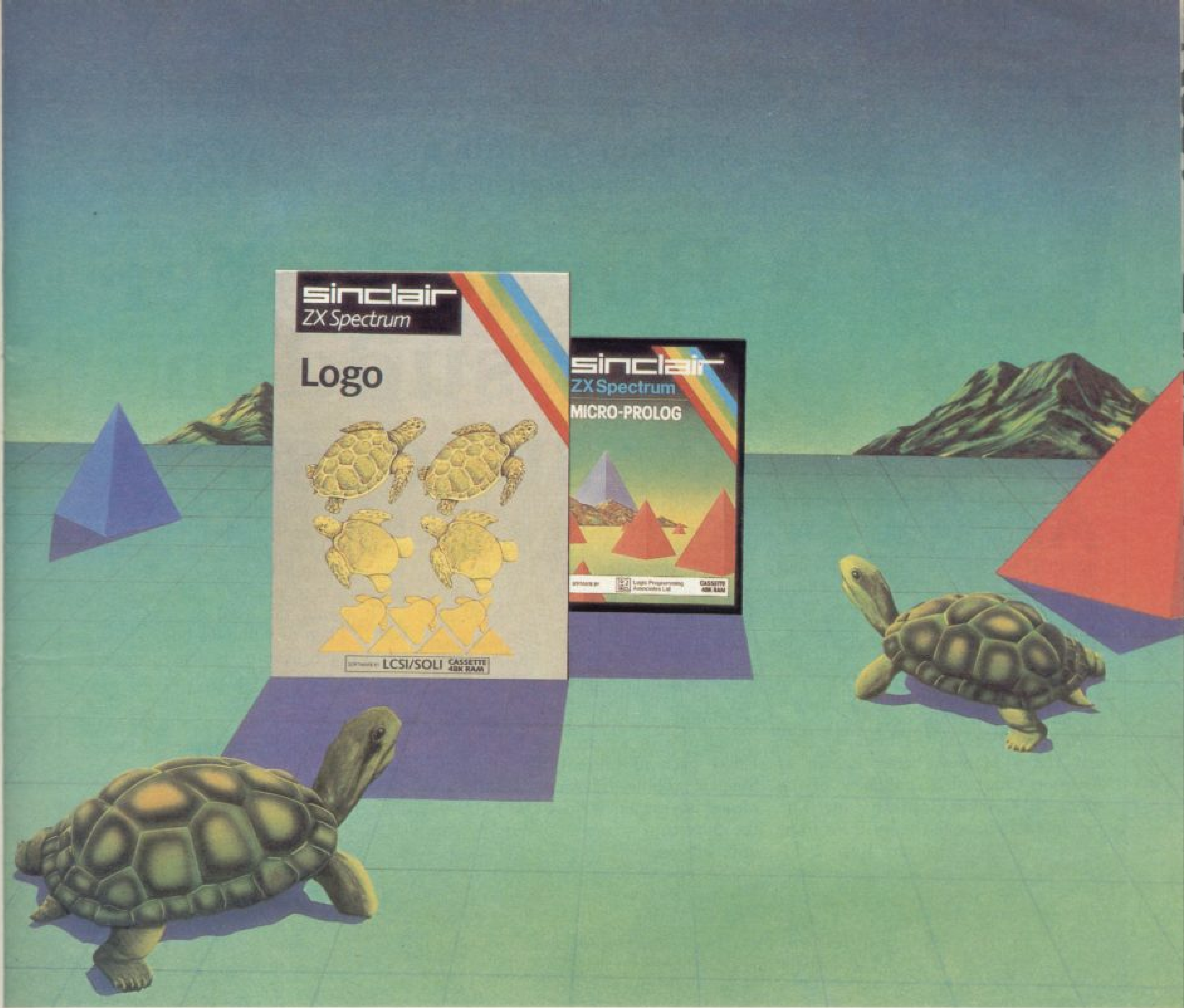
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Without doubt, LOGO and micro-PROLOG set new standards for future computer languages. You'll find them in major stores and all good computer shops – or from Griffin & George, E.J. Arnold and EDCO.

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Cricket Captain makes the first eleven. Chris Bourne interviews the team.

Bowled over by sudden success

ADLINGTON is cricket country. As the slow train north from Manchester emerges from the industrial suburbs into green fields and copses, you expect to see at every turn white-clad villagers performing the slow ritual of England's summer obsession. When the train reaches Adlington, there is Adlington Cricket Club, hedged and gated, the wicket immaculate and the pavilion gracefully decaying.

Adlington is also the home of Karl and Harry Manley, better known as Allanson Computing, publisher of the successful **Cricket Captain** game. The two brothers operate the business from their home in the village. Karl, a 23-year-old teacher, handles most of the administrative chores while his younger brother Harry writes the programs.

They had the notion of writing a commercial game in August, 1983 and the choice was influenced by **Football Manager** from Addictive.

"The idea of a cricket program struck me because I knew a little about the game and liked it," says 16-year-old Harry. "It took three weeks of non-stop work." Harry started with a detailed flowchart of the various sections of the game — "Spaghetti programming", according to Karl — and then designed the graphics.

The game is a scaled-down version of one-day cricket, with three-ball overs — you can pretend you are watching only the interesting strokes. It is similar to Football Manager in that you have a squad of players each with several skill factors, including one based on current averages, and after choosing the team the batting is all handled by the computer.

When it is your turn to bowl, however, you can set your field and choose your bowlers over by over, skill being the main determinant of whether you win or lose.

Harry's first experience of computers was, oddly enough, during a French language course in Guernsey. One of the teachers at his school had taken a UK-101 computer with him on the course and gave lessons in Basic programming. As soon as the ZX-80 arrived the brothers bought one.

They kept the machine for two years and Harry says it taught him a good deal. By 1982 they had exhausted the possibilities of their expanded machine, complete with weights perched on the RAM pack to prevent the notorious Sinclair wobble. They toyed with the idea of buying a new 8K ROM but then the Spectrum was announced so they ordered that.

The next landmark in Harry's career was the announcement of the Bolton Council Young Computer Programmer of the Year competition. Harry had been working on a program for his O level course and decided to enter. The project was an accounting program for a marina.

"My grandma runs a farm beside the Leeds-Liverpool canal and boat owners pay a few pounds to moor their boats." The program was designed to do the arithmetic for the operation, although Karl says their grandmother is not very fond of using it. Harry trudged through Bolton with his Spectrum in a black plastic bag and was a little alarmed at the size of the deputations of the other finalists. Nevertheless, he won first prize and it was at about that time that the brothers began to feel they could produce software of sufficiently high quality to market commercially.

When Cricket Captain was written, they decided to market it themselves. They thought they would be more successful if they had a name, and chose Allanson Computing after their grandmother's farm. They registered the company for VAT and put a classified advertisement in a weekly magazine. They sold five copies.

"We thought that was good," says Karl. "We cleared out costs and made a profit of about £10." The next move was to go to a local store at Bolton to persuade it to stock the game.

"It would not load at first," says Karl. "Then they found a bug in it. We could not believe it. It proved to be a problem with the GOSUB stack."

Having solved the problem, they managed to sell a few copies to the shop and also placed a semi-display advertisement in another magazine. That did not



succeed so well but by then a review of Cricket Captain had been published and orders began to arrive. "It was incredible," says Karl. "We were getting cheques and things. We were celebrating every day — we wrote to the first person to buy the game and told him we would send him a Christmas card."

Selling a dozen or so copies of a game may seem like peanuts but to Harry and Karl it was all the stimulus they required. In spite of the adverse reaction from other local shops, which did not appear to believe that the game could succeed where previous cricket games had failed, they decided to go for the big time and sent Cricket Captain to W H Smith. After a number of telephone calls as reminders of their continuing existence, they finally received an order for 1,000 copies of the game, provided they produced a proper colour inlay for the cassette.

"We were elated," says Karl. "I came from the farm with a bottle of wine and then thought 'Hang on, we have to get something sorted out first'." The bottle of wine remained intact and Karl and Harry set about improving the presentation of the game. They persuaded a schoolmaster friend, Len Bates, to design a colour picture for the cover and bought a cheap tape copier for £120.

"It was a good job we were on holiday," says Karl. "It took us three days to design and then it had to go to the printers. Smiths was good enough not to give us a definite date. We despatched a thumping great box. It was supposed to be a three-day service but the box spent two weeks in a Manchester warehouse."

The story might have ended there, since the insurance on the tapes was much less than their value, but luckily the error was discovered and the shipment was eventually delivered. Since then Smiths has placed two more orders for the game and it has appeared in the Top Ten listings. Harry and Karl remain down-to-earth about their success.

They have written to all the other major distributors but so far only Boots has shown interest. Nor have they received any cheques from Smiths, which has left Allanson Computing with an empty bank account and little capital for future projects. Once the money starts to flow, the brothers are planning new ventures.

Since Cricket Captain, they have already released **Lettafont,** a utility program developed primarily to aid them in writing their own programs. It redesigns the graphics and character set of the Spectrum offering a choice of typefaces.

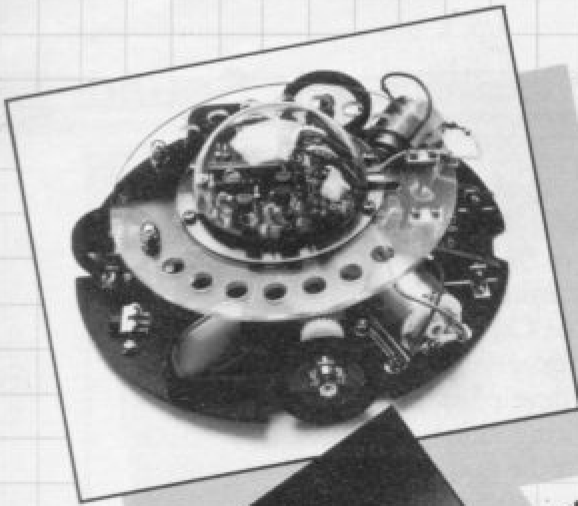
Harry is working on another project. "It simulates the sport of the future and is very near completion," he says. "It will include arcade action as well as strategy and the arcade routines will be in full machine code."

He has little trouble relating his success to school life. "My arch rival in the Bolton competition was a bit peeved," he says, "but most of my friends think it's great." He wants to study micro electronics at university, or a related subject. "I do not play games often," he says, and then adds "It is more fun to do it for money."

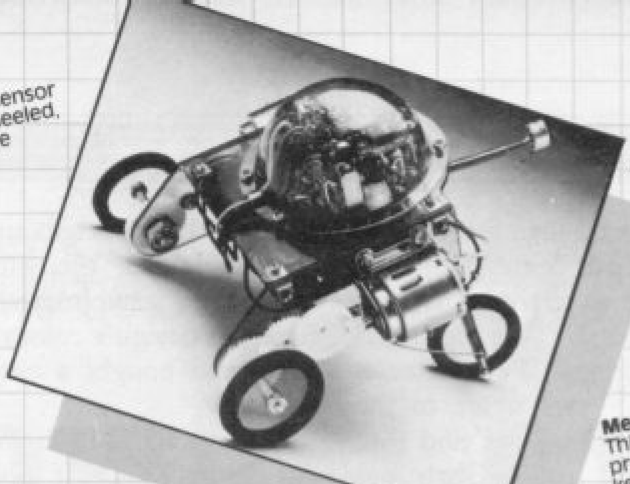
When he said it, he grinned. It reminded me of Ian Botham just about to hit a six.



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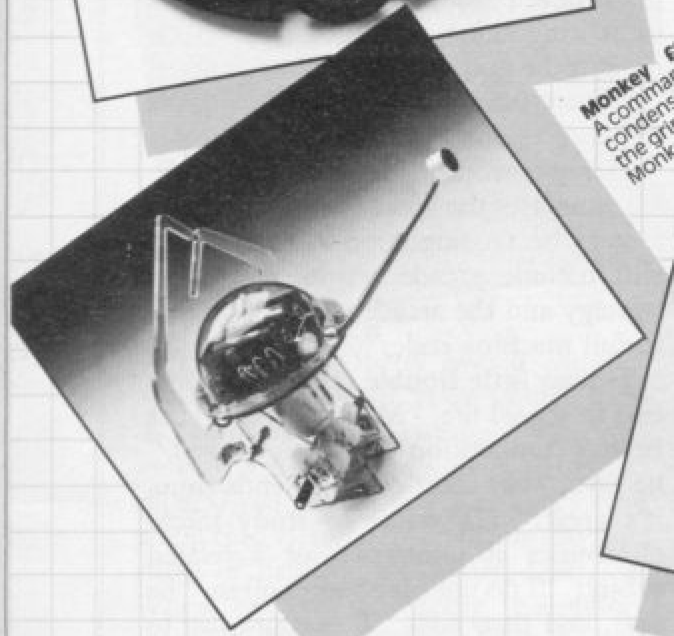


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Software for the Spectrum sportsman

John Gilbert goes for gold in a bid to find the best computer sports simulations

SUMMER is here, or so we are told by the weathermen, and instead of spending hours in front of a television set watching the Olympics or a Test match, why not spend hours creating your own little piece of history with one of the Spectrum sports packages on the market?

The Olympic Games have always brought with them a mass of souvenirs, ranging from flags to cuddly toys. This year is the same but there is an added dimension as computer software companies have tried to cash in with high-pressure selling of their sports programs, including ones which simulate Olympic events.

Automata, of **Pimania** fame, has a spoof version of the Games with the Pi-man working his way to gold in five events. The events include the Pi-Jump, Alpi-Skiing, Steepi-Chase, the Pitathlon, and the Butter-Pi, which is the swimming contest.

Each contest is animated smoothly and the graphics are detailed down to the last member of the crowd. After every contest has been lost or won the awards are given on the familiar three-position pedestal. If the Pi-man wins he takes a bow but if he loses he runs round the stadium shaking his fist at the crowd. Pi-man may have learned to be an athlete but he is certainly no sportsman.

Olympimania, being from Automata, is a joke but should provide the usual hours of fun if you can suffer the inane humour of the Pi-man. You might also like to try the experience of listening to the soundtrack of the Pi-Land International Anthem on the reverse side of the cassette.

The game should also appeal to people who find the real Olympics dull but if you take a more serious interest you will want to run **Olympics,** which is another spin-off from CRL. The program includes 14 events and is LOADed in two 48K parts.

Side one of the cassette includes events such as long jump, discus, shot putt and javelin. The other side contains six events which are held outside the stadium. They include cycling, swimming, canoeing and yachting. A marathon has also been included, run in five sections, each part between the other events.

In the standard game you will take the part of the British team. The computer will challenge the might of three other teams consisting of the United States, the Soviet Union and the Rest of the World — this might be the only



Olympimania

opportunity you have to see the Soviet Union compete in the Games.

Once you have been through the first half of the Games the medals your team has won will be added to the score you accumulate in the second half. Unfortunately, only gold medals are awarded and you receive no points for being second or third. That detracts from authenticity as the Olympics are not the same without silver and bronze.

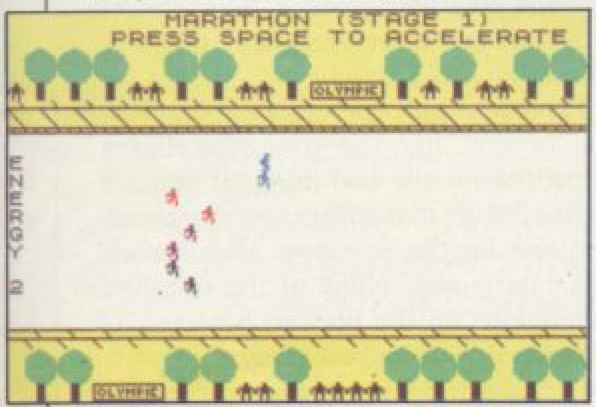
The graphics which show the events taking place are not so good as those of Olympimania but the ways in which the athletes compete in terms of skill and energy levels have been well thought out. Sufficient realism has been incorporated into the program that athletes will start to slow during the events if you over-stretch their limits.

The games are written in Basic with a corresponding slowness in the speed of graphics and the way in which results are calculated.

Olympics will interest fans who buy anything to do with the Games but will disappoint others who are looking for good sporting software.

The World Cup is to football enthusiasts what the Olympics is to athletics fans. Artic Computing has decided to produce its own **World Cup Football** for the Spectrum two years early.

You take the part of one of the teams playing in the cup and take it through a series of games to reach the final. Each game has the usual time-scale, including injury time if necessary, but the time



Olympics

factor is scaled-down so that each game takes about five minutes to play.

The graphics representation of play shows part of the field and the life-like actions of the players. The players even return to the dressing rooms at half-time.

Your control is limited to the footballer who is nearest to the ball in your team. That player will light up when in possession of the ball.

World Cup Football can be played at nine levels and there are 40 teams in contention. The game is addictive and should even be of interest to people who know nothing about football.

United, from CCS, on the other hand is a poor relation of the Addictive Games **Football Manager** and has none of the thrills of the Artic game. The four league tables are there, you can pick your team, and you can spy on the other teams to find their weak spots. The only people who will like it, however, are those who like looking at tables of figures, as the graphics displayed when games are taking place are appalling, having a green background with little pin-men making a brave effort to keep contact with the ball.

United is so uninteresting that it cannot be recommended, even to beginners. If you want a good game buy Football Manager, which is still the best value for money.

Super Soccer is much the same as United. It is poorly-presented, slow, and we also had difficulty in LOADing our copy, which could point to the use of low-quality cassettes for reproduction.

Winters is a small company which exists solely because of its range of sports programs. Super Soccer is not one of its better efforts, which is a pity, as some thought appears to have been put into the game. It can be obtained from Winters Ltd, 24 Swannington Close, Cantley, Doncaster, South Yorkshire DN4 6UA.

Super-League, for the 48K Spectrum, is from Cross Software and, thankfully, different from the other play-and-get-to-the-top-of-the-league games. At the start you have to decide the skill level at which you are to play. That is based, as ever, on the league position but, in the case of Super-League, you have either to finish in the top six, in the top half, or avoid relegation. Unfortunately the game is limited, as there is only one division in which to play. If you are relegated you join the losers and the game finishes.

Like many other football games on the market, the program is just a database which manipulates numbers to produce the league results. It would not be half so bad if the players were shielded from all the calculations by more varied methods of input but numbers have to be balanced on the skill sheets to provide marks for dribbling skill, strength of kick and supporting energy in attack and defence.

Everything is entered as numbers and the computer then plays the game for you. That is followed by a 30-second wait for results, which would deter the strongest of us from football for life.

It is obvious that the major criticism of the game is that you are not given sufficient involvement during play. Although Super-League will become tedious for hunters for action, there are sufficient aspects in it to hold the attention of a fanatic. It is pity that most of the game is played by the computer but if you prefer to plot strategy quietly and slowly, Super-League is for you.

The cricket season is in full swing and there are many games for the Spec-



World Cup Football

trum which will support fans when their teams have walked off out of the rain. **Ashes,** from Pulsonic, is the cheapest in the range at £1.99. It provides a good graphic simulation of the game for the 48K Spectrum. At the start you are given a choice of venues. There are 10 of them, five in England and five in Australia. Your choice will, of course, affect the type of bowlers you can select.

Each team has 11 players you can choose, or you can use the two teams which are already in the computer. You can specify the type of bowler you require as fast, swing/seam or spin. The toss is made and the winner automatically bats first. If you are not batting you will have to field your players to take advantage of the ground and particular batsmen. Positioning is limited as you can choose only from those positions indicated by the computer.

Like so many sports games, Ashes relies heavily on numeric input. If you are batting you have to match your stroke with the way the bowler pitches at you by entering a numeric option. The same is true of bowling. You must press a number to signify your choice of line and length.

Howzat, from Wyvern Software, is one of the best cricket games available. The graphics display is freer than Ashes, as you can decide where you want to put your players without restriction on field areas. You can also change the field if you think it is necessary at most points in the game.

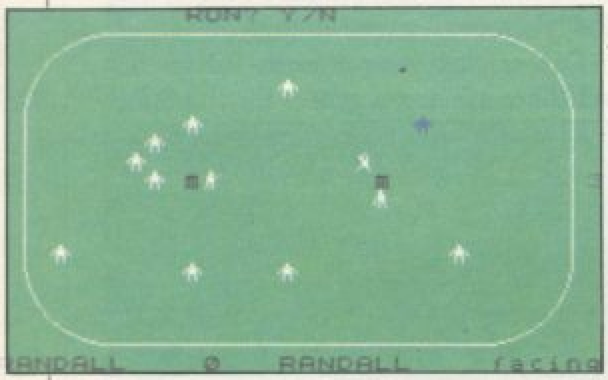
Wyvern has opted for realism as it has included 17 first-class county

continued on page 58

continued from page 57

squads and seven Test squads with which you can play. As with Ashes you can choose a standard team or select one of your own. Howzat, however, has an edge over Ashes as you have a wider range of teams from which to select your 11 players.

Details of matches and information about the state of players is given quickly and efficiently. Wyvern has even included a realistic scoreboard to show the events while play is taking place. Its depth of play and proximity to the real thing could not be beaten even by such games as **Test Match,** from CRL, or **Cricket Captain,** from Allanson Computing, which aim to produce the same effect.



Test Match

If your game is golf rather than cricket, there are many simulations of courses round Britain, including the **Troon** and **New Birkdale** classics from Hornby Software. Among the newer releases **Royal Birkdale,** from Ocean, is one of the best.

The game takes you to the famous course which has hosted the Open championship and has been the haunt of many famous players.

At the start you are given the opportunity to alter the wind speed conditions. You then select your club and take a position at the first tee. There are 10 clubs in all, the first being a driver and the last a sand iron. Directions are entered using a clockface technique in which 0 and 360 degrees point north. That is the method used by all computer golf games, although some vary the directions round the clock.

The instructions on the cassette insert are more than adequate and provide hints on how to play in the rough and which clubs to use on any occasion.

The course is laid out hole by hole and when your ball hits the green a close-up of the hole is given so that you have a better chance of holing the ball.

The only criticism is that the graphics representing the course are too detailed and the different areas of the course tend to clash with each other. If you can tolerate the cluttered screen display, Royal Birkdale should give you many hours of pleasure. Like any of the other sports games on the Spectrum it can be just as much fun for a non-sports player as for an enthusiast.

Virgin has recently issued its version of **Golf** but, unlike most of the other companies specialising in sports, it has aimed its program at the 16K Spectrum. The game, for one to four players, scores points on graphics display, which is more inviting and easier to read than that of Ocean, but it does not have the same feel of a real course Royal Birkdale offers.

The Virgin version offers play at a varying number of holes, from one to 18, and will allow you to use one of six clubs for each shot. Wind direction and speed are not taken into account so noticeably during the game but the names of the clubs and strength with which you hit the ball are important factors.

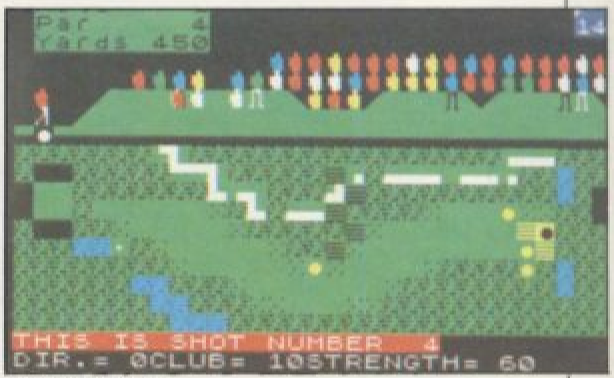
Golf uses the same direction input system as Royal Birkdale but is more precise as to the points of the compass in relation to the player. It is certainly a match for Royal Birkdale but the Ocean game wins for its authenticity.

If we were to apply a rule that all sports games had to be representative of reality, none of those reviewed would be worth playing. The best, such as World Cup Football, Troon and Royal Birkdale, are just barely simulations.

A fairer rule to apply would be that all the games provide entertainment for people who enjoy real sports, and most of those reviewed clearly do. Games using soccer, golf or cricket for their basis are not meant as full simulations and they are more likely to be played by computer users and sporting computer owners than sports enthusiasts.

Undoubtedly few Spectrums have been bought solely to play sports games and if they have that is a sad prediction for the future of the sporting world, which relies heavily on co-operation and team spirit. Computer games can go nowhere near to simulating that type of experience.

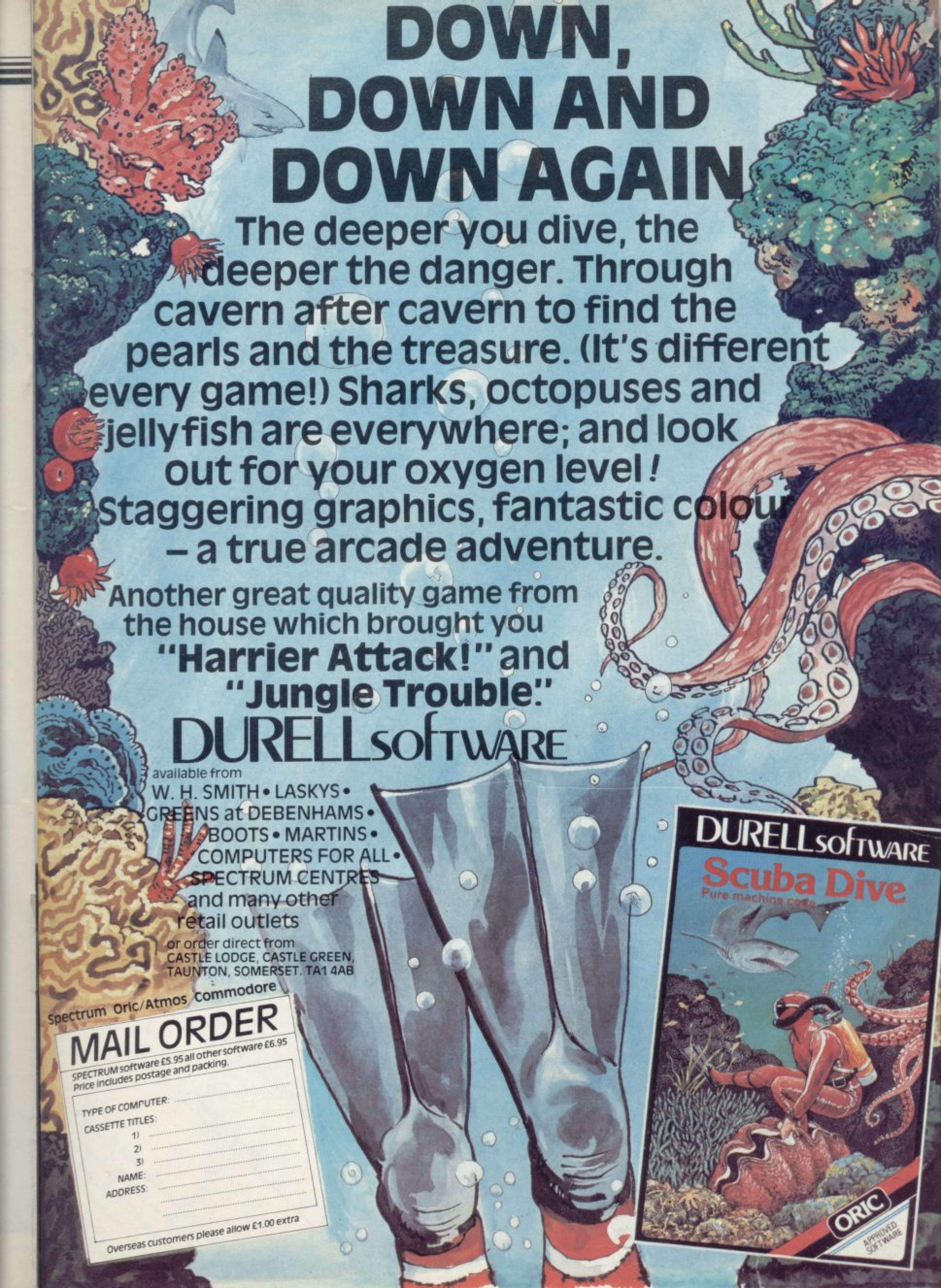
Most sports are outdoor activities and, like nothing else, lose much in translation to computer. Computers are limited in the way they store information and cannot take all the variables of game play into account. Most sports programs are, therefore, very limited in what they achieve.



Royal Birkdale

Players using computers to play football or golf may be trying to find a substitute for the real thing. If you are satisfied with that substitute, the games available for the Spectrum should keep you entertained. None of the so-called simulations on the market, however, is anywhere near the real thing.

	Memory	Price	Gilbert Factor
OLYMPIMANIA	48K	£6	6
OLYMPICS	48K	£6.95	6
WORLD CUP FOOTBALL	48K	£6.95	7
FOOTBALL MANAGER	48K	£6.95	7
UNITED	48K	£6	4
TROON	48K	£6.95	8
NEW BIRKDALE	48K	£6.95	8
ROYAL BIRKDALE	48K	£5.90	8
SUPER SOCCER	48K	£7	4
SUPER-LEAGUE	48K	£6.50	6
ASHES	48K	£1.99	7
CRICKET CAPTAIN	48K	£4.95	6
HOWZAT	48K	£6.95	8
TEST MATCH	48K	£5.95	6
GOLF	16K	£5.95	7



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Moving pictures

Is your Spectrum inanimate? Mike Rapps demonstrates how to put it through the motions

ONE OF the significant advantages of the 48K Spectrum over its 16K little brother is the ability to store and recall four or more screen displays. The recalling of such screens, using a short machine code routine, can result in very effective animation displays. Use is made of the powerful LDIR instruction, which recalls an entire screen in a fraction of a second. Interchanging the screens rapidly in this manner gives rise to the animation effect.

The technique is illustrated by two examples, first a simple representation of an internal combustion engine piston and, second, a practical application turning your TV into a very workable disco light set. The technique is limited only by the user's imagination.

The screen storage program which enables screens to be stored safely above RAMTOP is shown in figure one. The data for the store routine is contained in

```
 2   5 REM Screen storage
  10 CLEAR 31949: LET x=31950: L
ET y=32000
  20 RESTORE : FOR f=0 TO 11: RE
AD a: POKE x+f,a: NEXT f
  30 FOR f=0 TO 11: READ a: POKE
 y+f,a: NEXT f
 100 DATA 17,232,128,33,0,64,1,0
,27,237,176,201
 110 DATA 17,0,64,33,232,128,1,0
,27,237,176,201
 200 INPUT "Storage no. ";s
 210 IF s<1 OR s>4 THEN  GO TO 2
00
 220 LET a=s*7000+26000: LET a2=
INT (a/256): LET a1=a-a2*256
 230 POKE x+1,a1: POKE x+2,a2
 240 LET mc=USR x
 250 STOP
 999 SAVE "storage"CODE 32000,29
000
```

Figure 1.

line 100 and that for the recall in line 110. Lines 220 and 230 calculate the POKE values which are necessary to adapt the routines for the various individual screens. Each screen, including its attributes, occupies 6,912 bytes. For security and convenience they are stored 7,000 bytes apart and start at bytes 33,000, 40,000, 47,000 and 54,000. Enter the storage program and SAVE it.

To produce flicker-free animation, it is important that each screen is based on a template which remains constant. The template for the "piston" program is shown in figure two. That was produced using the **Melbourne Draw** program, which is also very useful at a later stage when adding details and attributes to the individual screens. Similar professionally-produced programs would no doubt serve as well and home-made drawing programs could suffice.

Once the template has been produced it should be saved on tape as a SCREEN. It can then be re-loaded and modified to produce the four individual screens, adding details and attributes as necessary — for the "piston" screens see figure three. They should also be saved on tape, sequentially, as individual SCREENs.

We need a program to control the animation. The program for the piston animation, which can easily be adapted for other uses, is shown in figure four. Lines 100, 110, 120 and 130 call the machine code routine to supply the various screens in order. That is achieved by poking into the fifth and sixth bytes of the recall routine — see line 110 of the storage program — the following values relating to the addresses from which the screen is being recalled:

Screen start byte	*Poke fifth byte*	*Poke sixth byte*
33,000	232	128
40,000	64	156
47,000	152	183
54,000	240	210

The overall effect is that the four individual screens eventually will be recalled sequentially, producing an animation effect. As a refinement, the program has been modified to give two

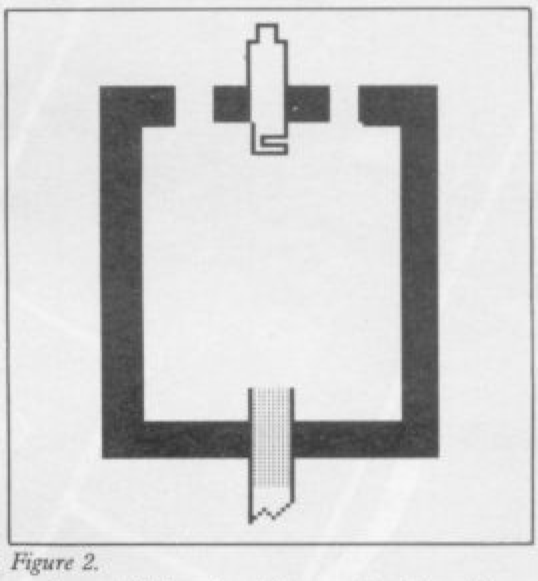


Figure 2.

options. Either it will run slowly, allowing the individual screens to be seen and labelled, or it will run at speed, in which case it appears to rival the original.

Once the control program has been evolved, it should be saved — SAVE " " LINE 999 — at the beginning of the tape which is eventually to be used for the whole program. Leave the tape set at the end of the program, clear the computer, LOAD the storage program and RUN it.

With the storage program running, return to the tape on which the four screens are saved. Load the first of them and activate the storage routine with GOTO 200 — do not use RUN, since

continued on page 63



GO FOR GOLD

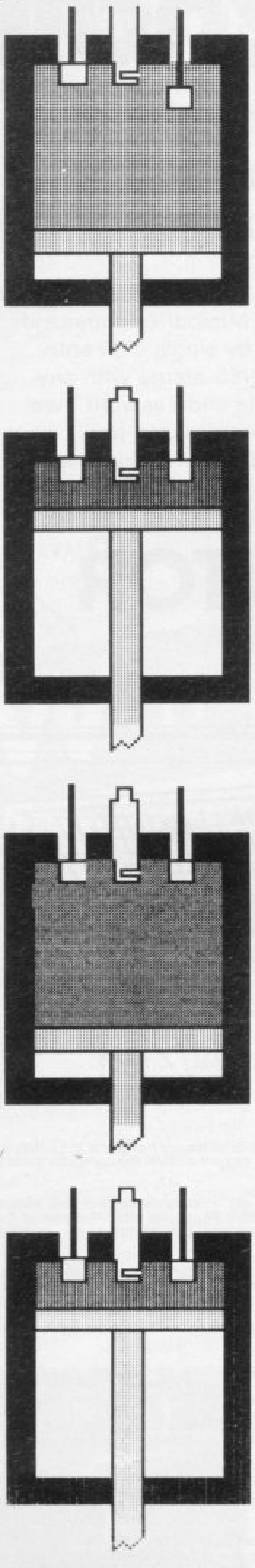


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Cases Computer Simulations Ltd., 14 Langton Way, London SE3 7TL.

WHSMITH Boots

Figure 3.



continued from page 61

that will clear the screen, which is somewhat counter-productive. In response to the prompt, store that screen with storage number 1. Then CLS, load the second screen and store as number 2. Repeat the procedure for the third and fourth screens.

Once that has been done, return to your main tape and, immediately after the control program, save the block of code which includes the four screens. That should be done as SAVE "name" CODE 32000, 29000 — see line 999 of control program. That will pick up the

```
  20 INPUT "Fast or Slow? (f/s)"
;a$: IF a$<>"f" AND a$<>"s" THEN
  GO TO 20
 100 POKE 32004,232: POKE 32005,
128: RANDOMIZE USR 32000
 101 IF a$="s" THEN  PRINT AT 15
,0;"1.INDUCTION": PAUSE 25
 110 POKE 32004,64: POKE 32005,1
56: RANDOMIZE USR 32000
 111 IF a$="s" THEN  PRINT AT 15
,0;"2.COMPRESSION": PAUSE 25
 120 POKE 32004,152: POKE 32005,
183: RANDOMIZE USR 32000
 121 IF a$="s" THEN  PRINT AT 15
,0;"3.IGNITION": PAUSE 25
 130 POKE 32004,240: POKE 32005,
210: RANDOMIZE USR 32000
 131 IF a$="s" THEN  PRINT AT 15
,0;"4.EXHAUST": PAUSE 25
 140 GO TO 100
 999 CLEAR 31999: LOAD ""CODE :
CLS : RUN
```

Figure 4.

recall routine automatically, stored at byte 32,000 onwards, which the control program will use. The tape can then be re-wound and the program run automatically.

An interesting variation is used in the program listed in figure five. The procedure is largely the same, the program being saved on tape and followed by the block of code, including the recall routine and four screens. The template for those screens consists of a screen produced by the following CIRCLE commands:

39,40,32
127,40,32
215,40,32
39,135,32
127,135,32
215,135,32

The six circles thus produced simulate disco lights and each is filled with a different INK colour in each individual screen, so that a flashing effect is produced — my view is that a block PAPER background produces the best effect.

Once the program has been saved and is running it controls the flashing effect by using the value of up to 255 returned on the computer EAR input socket, using the simple machine code routine contained in subroutine 400 to determine it.

Each time the value jumps by three or more from its previous value, line 115 calls in the next screen by means of the main subroutine — line 500 — and various subsidiary subroutines — lines 1000-1310. The figure of three is obviously adjustable but appears to produce the best results.

With the program running a musical input can be directed through the EAR socket and at a suitable volume will produce the flashing effect, controlled by the beat of the music. The difficulty with using a cassette player is that the use of the EAR socket on the player cuts out the loudspeaker, which is somewhat self-defeating. On my player, the jack plug can be manoeuvred into a half-in, half-out position, which allows both functions simultaneously but that is somewhat precarious.

I have produced a much more satisfactory arrangement on my music centre where I have run an extra two-core sound wire out of one of the loudspeakers, terminating it with a standard Sinclair jack plug which can then be

```
 100 RANDOMIZE : LET m=0: LET n
=0
 103 GO SUB 400
 115 IF USR v>m+3 THEN  GO SUB 5
00
 116 LET m=USR v
 120 GO TO 110
 400 LET v=32050
 410 FOR f=v TO v+17: READ d: PO
KE f,d: NEXT f: RETURN
 420 DATA 1,0,255,17,0,0,219,254
,203,119,32,1,19,16,247,66,75,20
1
 500 BORDER INT (RND*6)+1: LET n
=n+1
 510 GO SUB 1000+(n*100): IF n=3
 THEN  LET n=0
 520 RETURN
1000 POKE 32004,232: POKE 32005,
128: LET mc=USR 32000
1010 RETURN
1100 POKE 32004,64: POKE 32005,1
56: LET mc=USR 32000
1110 RETURN
1200 POKE 32004,152: POKE 32005,
183: LET mc=USR 32000
1210 RETURN
1300 POKE 32004,240: POKE 32005,
210: LET mc=USR 32000
1310 RETURN
9999 CLEAR 31999: LOAD ""CODE :
RUN
```

Figure 5.

plugged into the Spectrum EAR socket. The music centre is thus effectively interfaced through the Spectrum to the TV.

Copies of the disco and piston programs can be obtained by sending a cheque/PO for £3 and s.a.e. to M J Rapps, 30 Cambrian Drive, Yate, Bristol BS17 5TS.

Little Brothers should be seen but not heard.





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The HR-5 also has something of an artistic bent. Being capable of producing uni-directional graphics and chart images together with bi-directional text. What's more it will hone down characters into a condensed face, or extend them for added emphasis.

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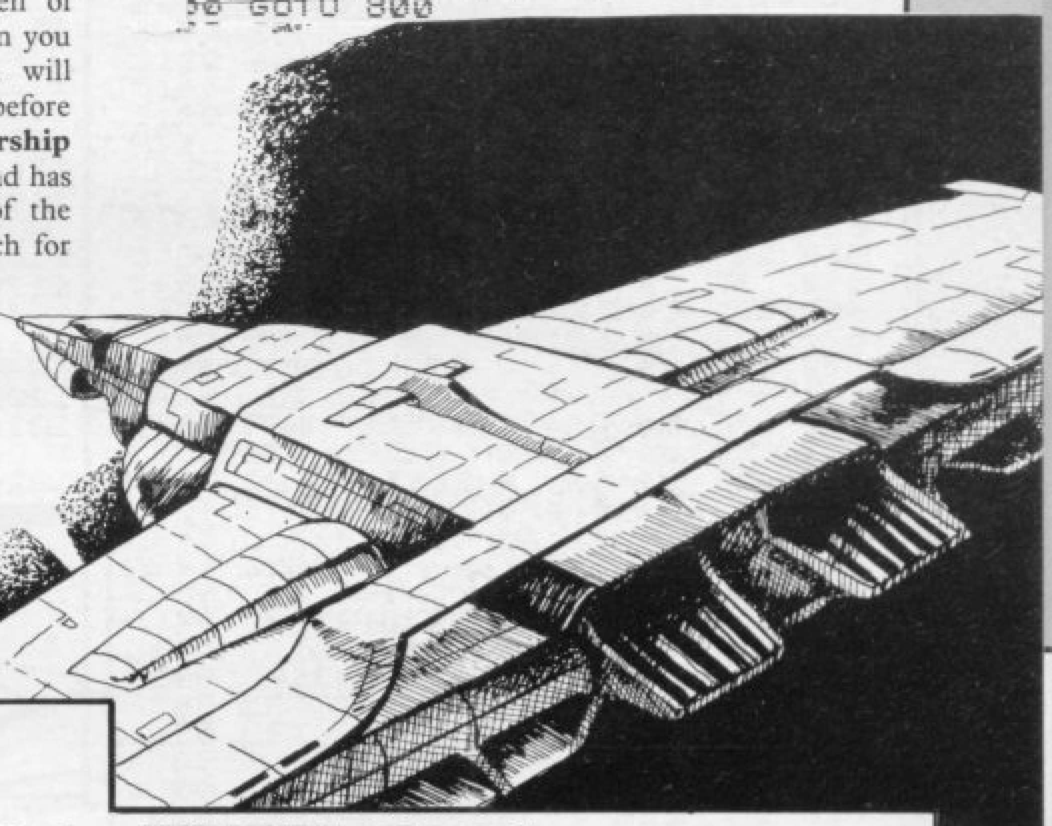
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PROGRAM PRINTOUT

Starship Nova

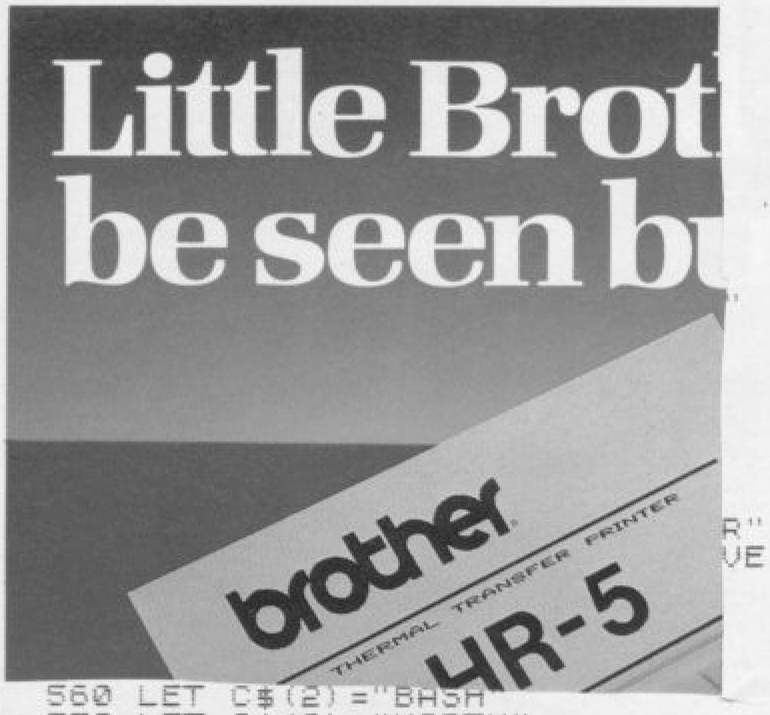
IN STARSHIP NOVA by Andrew Green of Andover you are hurtling into the sun. Can you find the microchip and batteries which will breathe new life into your starship thrusters before cosmic obliteration frazzles your brain? **Starship Nova** is a text adventure for the 16K ZX-81 and has a random generation option for the layout of the Starship, so each game can be different. Watch for the Daleks.



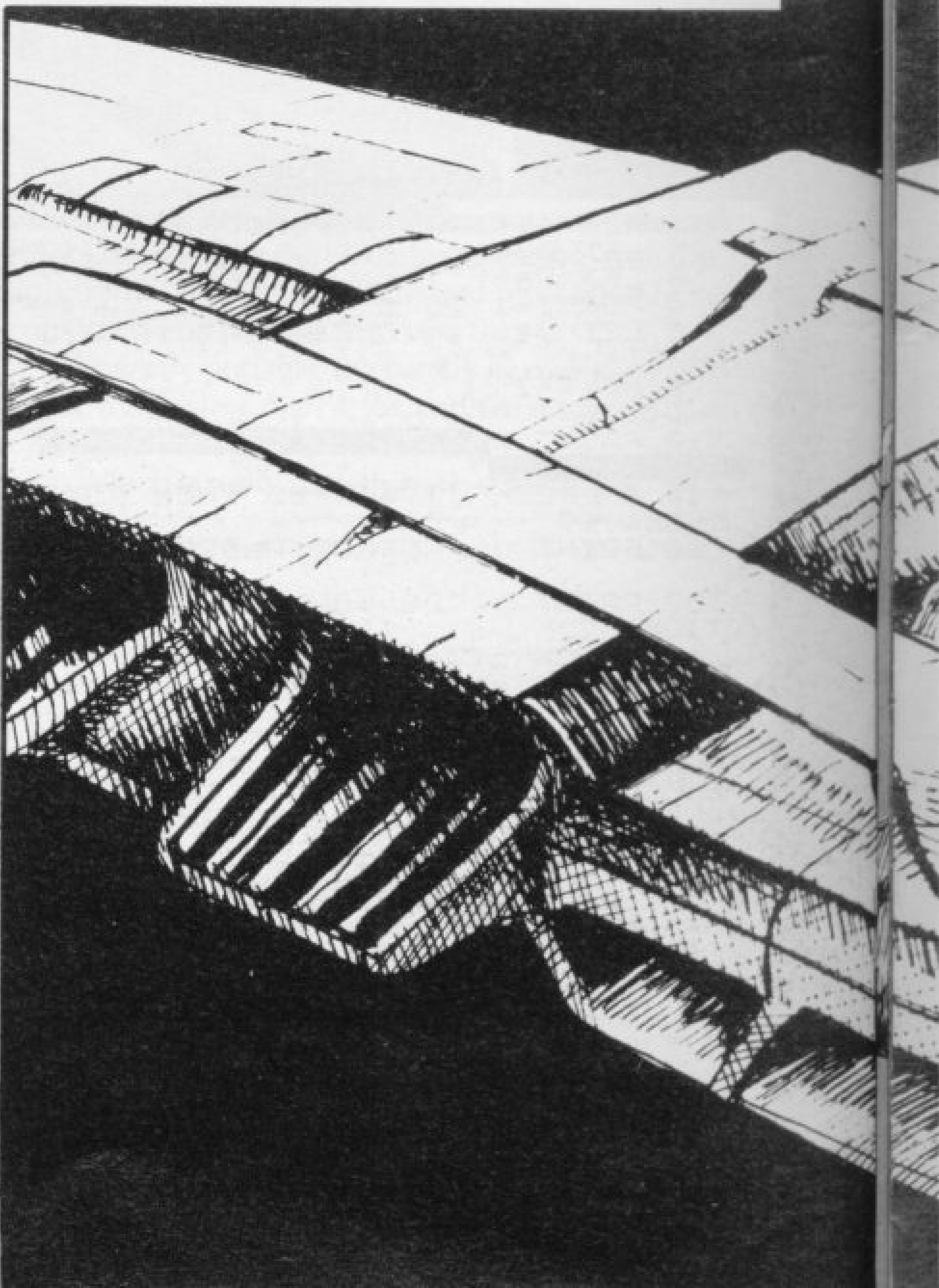
```
   1 REM ***STARSHIP*NOVA***
   2 LET D=0
   3 LET U$=""
   4 FOR I=1 TO 5
   5 LET U$=U$+(CHR$ (INT (RND*3
7)+28))
   6 NEXT I
   7 CLS
  10 PRINT "              STARSHIP NO
VA         "
  15 IF PEEK 16744<>60 THEN POKE
 16384,29
  20 PRINT ,,"AUTHOR:ANDREW GREE
N"
  30 PRINT ,,"DO YOU WANT INSTRU
CTIONS ?"
  40 IF INKEY$="N" THEN GOTO 90
  50 IF INKEY$<>"Y" THEN GOTO 40
  60 CLS
  61 PRINT "YOU MUST STOP YOUR S
PACESHIP    FROM PLUNGING INTO T
HE SUN.YOU  MUST FIND A MICRO-CH
IP TO REPAIRIT AND A BATTERY FOR
 POWER.YOU  MAY ALSO FIND OTHER
OBJECTS THATARE USEFUL,BUT BEWAR
E,ONE IS    BOOBY-TRAPPED.(TO US
E AN OBJECT TYPE IN ITS NAME.)"
  62 PRINT ,,"YOU HAVE 2 AND A H
ALF HOURS TO  REPAIR YOUR SHIP.Y
OU WILL FACE  SEVERAL DANGERS DU
RING THIS     ADVENTURE.",,"HERE
 IS A LIST OF COMMANDS:",,,"ZAP,
BASH,NORTH,SOUTH,EAST,WEST, TAKE
,DROP,PRESS,QUIT,INFO,WAIT."
  63 PRINT ,,,,"              GOOD
LUCK            "
  64 PRINT "       PRESS A KEY TO
BEGIN      "
  65 IF INKEY$<>"" THEN GOTO 65
  70 IF INKEY$="" THEN GOTO 70
  80 CLS
  90 PRINT "WHICH SHIP LAYOUT DO
YOU WANT ?",,,"(1-50000)",,,"0
FOR A RANDOM SHIP"
 100 INPUT A
 105 IF A>0 THEN LET A=A+872
 110 RAND A
 120 FAST
 130 DIM S(10,10)
 140 DIM D(10,10)
 150 DIM O(10,10)
 160 FOR I=1 TO 10
 170 FOR J=1 TO 10
 180 LET S(I,J)=INT (RND*10)+1
 190 NEXT J
 200 NEXT I
 210 FOR I=1 TO 8
 220 LET A=INT (RND*10)+1
 230 LET B=INT (RND*10)+1
 240 IF O(A,B)>0 THEN GOTO 220
 250 LET O(A,B)=I
 260 NEXT I
 270 DIM M(10,10)
 280 FOR I=1 TO 25
 290 LET A=INT (RND*10)+1
```

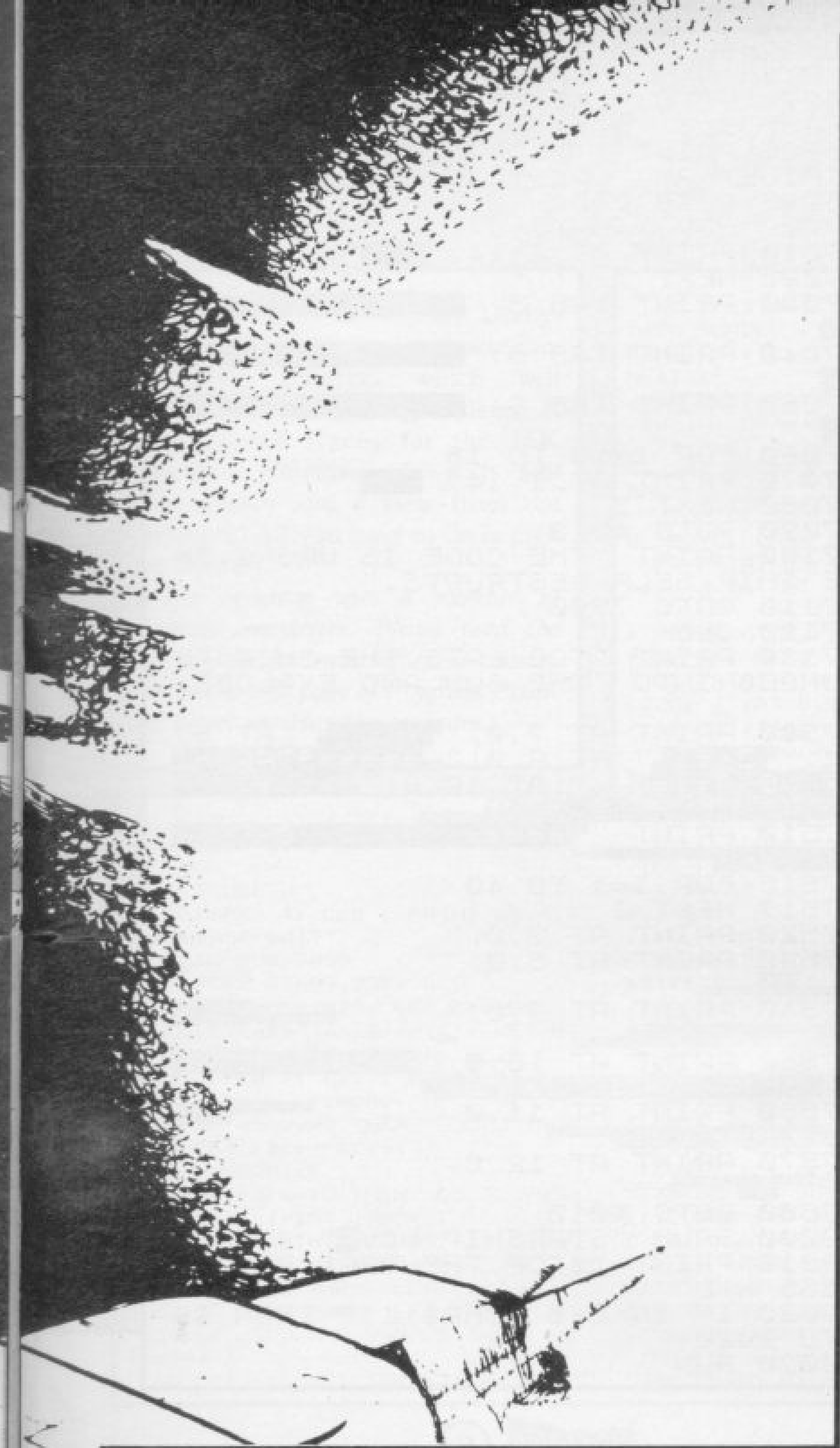
continued on page 68

```
00 IF E(5)=0 THEN GOTO 1050
10 IF E(6)=0 THEN GOTO 1110
20 CLS
30 PRINT "A VOICE SAYS,""THE C
 IS,          """;U$;""".""""
40 GOTO 800
00 IF E(6)=0 THEN GOTO 1050
10 IF E(5)=0 THEN GOTO 1130
20 GOTO 2520
00 IF E(7)=0 THEN GOTO 1050
10 CLS
20 PRINT "THE SONIC SCREWDRIVE
EXPLODES  AND BLOWS UP THE SHI
WITH YOU  ON BOARD.HA,HA.YOU A
 DEAD."
30 GOTO 7500
00 IF E(8)=0 THEN GOTO 1050
10 CLS
20 LET T$=""
25 LET Q$=STR$ T
30 FOR I=1 TO LEN Q$
40 LET T$=T$+(CHR$ (CODE (Q$(I
+128))
50 NEXT I
60 CLS
70 PRINT AT 11,0;" YOU HAVE ";
 " MINUTES LEFT        "
90 GOTO 800
```




```
R"
VE
 560 LET C$(2)="BASH"
 570 LET C$(3)="NORTH"
 580 LET C$(4)="SOUTH"
 590 LET C$(5)="EAST"
 600 LET C$(6)="WEST"
 610 LET C$(7)="TAKE"
 620 LET C$(8)="DROP"
 630 LET C$(9)="PRESS"
 640 LET C$(10)="QUIT"
 650 LET C$(11)="WAIT"
 660 LET C$(12)="INFO"
 670 DIM M$(5,18)
 680 LET M$(1)="A BIOLOGICAL FRE
AK"
 690 LET M$(2)="A GREEN MARTIAN"
 700 LET M$(3)="AN ALIEN ROBOT"
 710 LET M$(4)="A DALEK"
 720 LET M$(5)="A SONTARAN"
 730 DIM E(10)
 740 LET E(9)=50
 750 LET T=150
 760 LET A=INT (RND*10)+1
 770 LET A1=A
 780 LET B=INT (RND*10)+1
 790 LET B1=B
 795 SLOW
 800 FOR I=1 TO 50
 810 NEXT I
 820 IF PEEK 16398+256*PEEK 1639
9>PEEK 16396+256*PEEK 16397+363
THEN CLS
 830 PRINT "YOU ARE IN A";R$(S(A
,B))
 840 PRINT ,,"I CAN SEE:"
 850 IF S(A,B)=10 THEN GOTO 1170
 855 IF S(A,B)=3 AND RND>.75 THE
N GOTO 6905
 860 IF O(A,B)>0 THEN PRINT "A "
;O$(O(A,B))
 870 IF D(A,B)>0 THEN PRINT "A "
;O$(D(A,B))
 875 IF D(A,B)=0 AND O(A,B)=0 TH
EN PRINT "NOTHING OF USE"
 876 IF M(A,B)>0 THEN PRINT M$(M
(A,B))
 877 IF M(A,B)=0 THEN PRINT "NO
MONSTERS"
 880 PRINT "EXITS ARE"
 890 IF A>1 THEN PRINT "NORTH"
 900 IF A<10 THEN PRINT "SOUTH"
 902 IF B>1 THEN PRINT "EAST"
 905 IF B<10 THEN PRINT "WEST"
 906 IF E(9)<10 THEN PRINT "YOU
ARE FEELING TIRED."
 908 IF T<30 THEN PRINT "YOU HAD
 BETTER HURRY UP."
 909 IF T<0 THEN GOTO 7120
 910 PRINT "WHAT ARE YOUR INSTRU
CTIONS ?"
 920 INPUT I$
 925 LET T=T-1
 930 LET I$=I$+"    "
 940 IF PEEK 16398+256*PEEK 1639
9>PEEK 16396+256*PEEK 16397+627
THEN CLS
 950 PRINT ">";I$
 960 FOR I=1 TO 12
 970 IF I$( TO 3)=C$(I, TO 3) TH
EN GOTO 3000+(I*100)
 980 NEXT I
 990 FOR I=1 TO 8
1000 IF I$( TO 3)=O$(I, TO 3) TH
EN GOTO 2000+(100*I)
1010 NEXT I
1020 REM ***ERROR*REPORTS***
1030 PRINT "I DO NOT UNDERSTAND
"""";
1032 IF PEEK 16441<LEN I$-2 THEN
 PRINT
1034 PRINT I$( TO LEN I$-3);""""
1040 GOTO 800
1050 PRINT "YOU DO NOT OWN THAT
ITEM"
1060 GOTO 800
1070 PRINT "YOU ARE NOT IN THE C
ONTROL ROOM."
1080 GOTO 800
1090 PRINT "NO MONSTER TO KILL"
1100 GOTO 800
1110 PRINT "WHAT ARE YOU GOING T
O PLAY IT ON"
1120 GOTO 800
1130 PRINT "YOU HAVE NO CASSETTE
 TO PLAY ON IT."
1140 GOTO 800
1150 PRINT "OK CLINT,TRY FINDING
 A LASER    FIRST."
1160 GOTO 800
1170 PRINT "NOTHING IT IS DARK"
1180 GOTO 910
1190 PRINT "WHAT ABOUT THE MONST
ER ?"
1200 GOTO 800
1210 PRINT "YOU CANNOT GO IN THA
T DIRECTION."
1220 GOTO 800
```



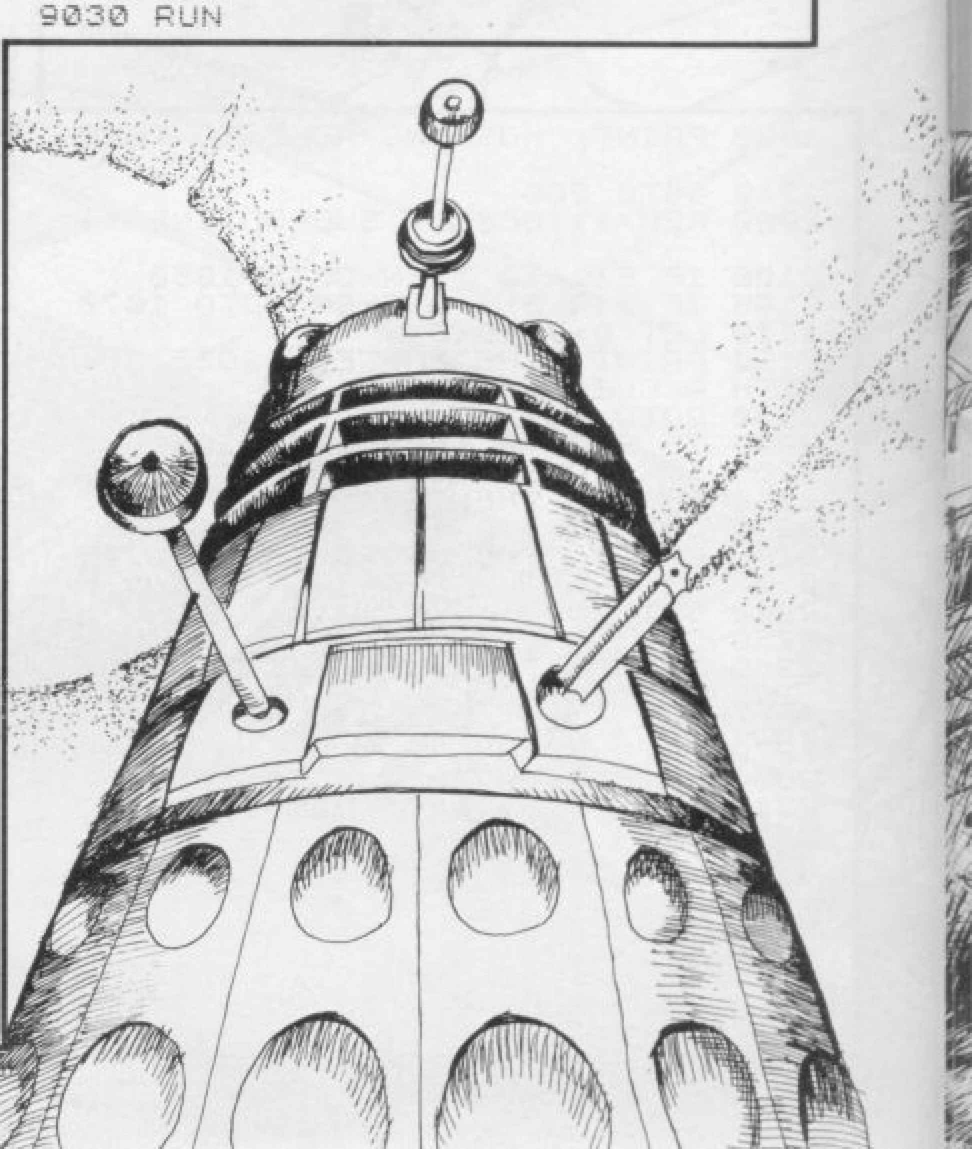


```
1230 PRINT "NOTHING HERE TO TAKE
"
1240 GOTO 800
2000 REM ***OBJECT SUBROUTINES**
*
2100 IF E(1)=0 THEN GOTO 1050
2105 IF S(A,B)<>1 THEN GOTO 1070
2110 LET D=D+(D<2)
2120 PRINT "THE BATTERY GOES IN
WITH A CLICK"
2130 GOTO 800
2200 IF E(2)=0 THEN GOTO 1050
2205 IF S(A,B)<>1 THEN GOTO 1070
2210 IF D=1 THEN GOTO 2250
2220 LET D=D+(D<2)
2230 PRINT "THE MICRO-CHIP SLIDE
S IN"
2240 GOTO 800
2250 CLS
2260 PRINT "THE ELECTRICITY FROM
 THE BATTERYKILLS YOU AS YOU INS
ERT THE      MICRO-CHIP."
2270 GOTO 7000
2300 IF E(3)=0 THEN GOTO 1050
2310 IF S(A,B)<>10 THEN GOTO 109
0
2315 CLS
2320 PRINT "THE TORCH LIGHTS UP"
2330 PRINT "I CAN SEE:"
2340 GOTO 860
2400 IF E(4)=0 THEN GOTO 1050
2410 IF M(A,B)=0 THEN GOTO 1090
2420 GOTO 3400
2500 IF E(5)=0 THEN GOTO 1050
2510 IF E(6)=0 THEN GOTO 1110
2520 CLS
2530 PRINT "A VOICE SAYS,""THE C
ODE IS,       """;U$;""".""
2540 GOTO 800
2600 IF E(6)=0 THEN GOTO 1050
2610 IF E(5)=0 THEN GOTO 1130
2620 GOTO 2520
2700 IF E(7)=0 THEN GOTO 1050
2710 CLS
2720 PRINT "THE SONIC SCREWDRIVE
R EXPLODES  AND BLOWS UP THE SHI
P WITH YOU   ON BOARD.HA,HA.YOU A
RE DEAD."
2730 GOTO 7500
2800 IF E(8)=0 THEN GOTO 1050
2810 CLS
2820 LET T$=""
2825 LET Q$=STR$ T
2830 FOR I=1 TO LEN Q$
2840 LET T$=T$+(CHR$ (CODE (Q$(I
))+128))
2850 NEXT I
2860 CLS
2870 PRINT AT 11,0;" YOU HAVE ";
T$;" MINUTES LEFT    "
2880 GOTO 800
3100 IF E(4)=0 THEN GOTO 1150
3110 IF M(A,B)=0 THEN GOTO 1090
3120 CLS
3130 PRINT "YOUR LASER DISINTEGR
ATES          THE MONSTER IN ONE B
LAST."
3140 LET T=T-1
3150 LET E(9)=E(9)-1
3155 LET E(10)=E(10)+1
3160 LET M(A,B)=0
3170 GOTO 800
3200 IF M(A,B)=0 THEN GOTO 1090
3205 CLS
3210 LET Y=M(A,B)
3220 FOR I=1 TO RND*(Y*2)+1
3230 LET X=INT (RND*6)*6+1
3240 PRINT "BONK  OUCH  SPLAT WA
LLOPCLANK BANG  "(X TO X+5)
3250 LET E(9)=E(9)-1
3255 IF E(9)<=0 THEN GOTO 6920
3260 LET T=T-1
3270 NEXT I
3280 PRINT "THE MONSTER IS IN A
HEAP ON THE FLOOR"
3285 LET E(10)=E(10)+1
3290 LET M(A,B)=0
3295 GOTO 800
3300 IF M(A,B)>0 AND S(A,B)<>10
THEN GOTO 1190
3310 IF A=1 THEN GOTO 1210
3320 LET A1=A
3325 LET B1=B
3330 LET A=A-1
3340 PRINT "YOU MOVE INTO ANOTHE
R ROOM"
3350 IF S(A1,B1)=10 AND M(A1,B1)
>0 AND RND<.75 THEN GOTO 6950
3360 GOTO 800
3400 IF A=10 THEN GOTO 1210
3405 IF M(A,B)>0 AND S(A,B)<>10
THEN GOTO 1190
3410 LET A1=A
3415 LET B1=B
3420 LET A=A+1
3430 GOTO 3340
3500 IF B=1 THEN GOTO 1210
3510 IF M(A,B)>0 AND S(A,B)<>10
THEN GOTO 1190
3520 LET B1=B
3525 LET A1=A
3530 LET B=B-1
3540 GOTO 3340
3600 IF B=10 THEN GOTO 1210
3605 IF M(A,B)>0 AND S(A,B)<>10
THEN GOTO 1190
3610 LET B1=B
3615 LET A1=A
3620 LET B=B+1
3630 GOTO 3340
3700 IF O(A,B)=0 AND D(A,B)=0 TH
```

continued on page 70

continued from page 69

```
EN GOTO 1230
3710 IF O(A,B)=0 THEN GOTO 3740
3720 LET E(O(A,B))=1
3725 LET O(A,B)=0
3730 IF D(A,B)=0 THEN GOTO 3750
3740 LET E(D(A,B))=1
3745 LET O(A,B)=0
3750 PRINT "OK"
3760 GOTO 800
3800 PRINT "WHICH OBJECT DO YOU
WANT TO DROP"
3810 INPUT I$
3815 LET I$=I$+"   "
3820 FOR I=1 TO 8
3830 IF I$( TO 2)=O$(I, TO 2) TH
EN GOTO 3850
3840 NEXT I
3845 GOTO 1030
3850 IF E(I)=0 THEN GOTO 1050
3860 LET D(A,B)=I
3870 LET E(I)=0
3880 PRINT "OK"
3890 GOTO 800
3900 IF S(A,B)<>1 THEN GOTO 1070
3910 IF D<2 THEN GOTO 6980
3920 CLS
3930 PRINT "THE CONSOLE LIGHTS U
P.A MESSAGE ON THE SCREEN SAYS,"
"ENTER THE   CODE OR BE DESTROYE
D"""
3940 INPUT I$
3950 IF I$<>U$ THEN GOTO 7100
3960 PRINT "             CORRECT
          "
3970 PRINT ,,"  THE ENGINES FIRE
 AND YOUR      SPACESHIP FLIES OF
F INTO SPACE. WELL DONE.YOU HAD
ONLY ";T,"MINUTES LEFT."
3975 PRINT "YOU KILLED ";E(10);"
 MONSTERS"
3980 PRINT "AND STILL HAD ";E(9)
;" STRENGTH PTS"
3990 GOTO 4010
4000 CLS
4005 PRINT "             CHICKEN
          ",,
4010 PRINT "WOULD YOU LIKE ANOTH
ER GAME ?"
4020 IF INKEY$="Y" THEN RUN
4030 IF INKEY$="N" THEN NEW
4040 GOTO 4020
4100 PRINT "WAITING"
4110 IF INKEY$="" THEN GOTO 4110
4120 IF INKEY$<>"" THEN GOTO 412
0
4200 CLS
4210 PRINT "YOU ARE CARRYING:"
4220 FOR I=1 TO 8
4230 IF E(I)>0 THEN PRINT "A ";O
$(I)
4240 NEXT I
4250 IF E(1)=0 AND E(2)=0 AND E(
3)=0 AND E(4)=0 AND E(5)=0 AND E
(6)=0 AND E(7)=0 AND E(8)=0 THEN
 PRINT "NOTHING"
4260 PRINT ,,"YOUR STRENGTH IS "
;E(9)
4265 PRINT "COMMANDS ARE:ZAP,BAS
H,NORTH,     SOUTH,EAST,WEST,TAKE
,DROP,PRESS,QUIT,WAIT,INFO."
4270 PRINT "PRESS A KEY TO RETUR
N TO THE     GAME."
4280 IF INKEY$="" THEN GOTO 4280
4290 GOTO 820
6905 PRINT "THE AIRLOCK DOOR OPE
NING...YOU   ARE SUCKED OUT INTO
SPACE.YOU    CANNOT BREATH AND DI
E."
6906 FOR I=1 TO 45
6907 NEXT I
6908 CLS
6910 GOTO 7000
6920 CLS
6930 PRINT "THE MONSTER KILLED Y
OU"
6940 GOTO 7000
6950 CLS
6960 PRINT "A MONSTER JUMPS OUT
OF THE       SHADOWS AND ZAPS YOU
 WITH A     LASER CANNON."
6970 GOTO 7000
6980 CLS
6990 PRINT "THE CONTROLS SHORT-C
IRCUIT AND   DESTROY THE SHIP."
6995 GOTO 7500
7000 FOR I=6 TO 9
7010 PRINT AT I,14;"   "
7020 NEXT I
7030 PRINT TAB 8;"       STARSHI
 "
7040 PRINT TAB 8;"     R.I.P
 "
7050 PRINT TAB 8;"
 "
7060 FOR I=13 TO 18
7070 PRINT AT I,14;"   "
7080 NEXT I
7090 GOTO 4010
7100 PRINT "THE CODE IS WRONG.TH
E SHIP SELF-DESTRUCTS."
7110 GOTO 7500
7120 CLS
7130 PRINT "TOO LATE,THE SHIP PL
UNGES INTO   THE SUN AND EXPLODES
"
7500 PRINT AT 7,0;"        ";AT 8,
1;" ZX81 ";AT 9,0;" ======STARSHI
P NOVA===    ";AT 10,0;" ======
       O   "
7510 PRINT " ======))(-      O ,..
         "
7515 FOR I=1 TO 40
7517 NEXT I
7520 PRINT AT 7,0;"          "
7530 PRINT AT 8,0;"
       "
7540 PRINT AT 9,0;"
       "
7550 PRINT AT 10,0;"
       "
7560 PRINT AT 11,0;"
       "
7570 PRINT AT 12,0;"
       "
7580 GOTO 4010
9000 SAVE "STARSHIP NOVA"
9010 PRINT "STOP THE TAPE AND PR
ESS N/L"
9020 IF INKEY$<>CHR$ 118 THEN GO
TO 9020
9030 RUN
```



A day at the races

A G BIRD of Ripley, Derbyshire submitted a horse-racing program which will appeal to inveterate gamblers. **A Day at the Races** for the 16K Spectrum provides you with £20 stake money and a view from the enclosure. All you have to do is pick the winners.

The program uses a number of graphics characters. Please read the instructions for entering these characters on the first page of Program Printout before entering the program.

```
   1 PRINT AT 4,7;"PRESS ANY KE
Y FOR";AT 6,7;"A DAY AT THE RACE
S"
   2 PAUSE 0
   3 PAPER 4: CLS : PRINT AT 4,1
0;"PLEASE WAIT"
   5 GO SUB 9000
  10 POKE 23609,255: CLS
  15 LET money=20: LET race=0
  20 LET a$="(sp)A(sp)C": LET b$
="(sp)DEF": LET c$="(sp)GHI"
  25 PAPER 7: CLS : PRINT AT 1,1
8;"You have £";money
  30 IF money=0 THEN  GO TO 9900
  32 LET race=race+1
  34 RANDOMIZE
  38 IF race=10 THEN  GO TO 9950
  40 LET c1=INT (RND*3)
  42 LET c2=INT (RND*3)
  44 LET c3=INT (RND*3)
  50 IF c1=2 THEN  LET c1=7
  52 IF c2=2 THEN  LET c2=7
  54 IF c3=2 AND RND>.5 THEN  LE
T c3=7
  60 LET sad=INT (RND*3)+4
  65 IF sad=4 THEN  LET sad=2
  70 BORDER 4: FOR f=10 TO 21: P
RINT AT f,0; PAPER 4;"(32*sp)":
NEXT f
  75 PLOT 0,96: DRAW 36,36: DRAW
 183,0: DRAW 36,-36
  76 PLOT 0,96: DRAW 0,16: DRAW
36,24: PLOT 255,96: DRAW 0,16: D
RAW -36,24
  77 PLOT 36,132: DRAW 0,16: DRA
W 183,0: DRAW 0,-16
  78 PRINT AT 4,5; INK 1; PAPER
6;"  A DAY AT THE RACES  "
  80 FOR f=6 TO 9: FOR d=4 TO 14
: PRINT AT f,d; INK 2;"J";AT f,d
+13;"J": NEXT d: NEXT f
  85 PRINT  INK 2;AT 7,3;"J";AT
7,28;"J";AT 8,2;"JJ";AT 8,28;"JJ
";AT 9,1;"JJJ";AT 9,28;"JJJ"
  90 FOR f=0 TO 31: PRINT AT 10,
f; INK 1; PAPER 7;"K";AT 21,f;"K
": NEXT f
  95 IF race=9 THEN  PRINT AT 21
,11; FLASH 1;"LAST RACE"
 100 PRINT AT 12,0; INK c1; PAPE
R 4;a$;AT 13,0;b$;AT 12,2; INK s
ad;"B"
 110 PRINT AT 15,0; INK c2; PAPE
R 4;a$;AT 16,0;b$;AT 15,2; INK s
ad+1;"B"
 120 PRINT AT 18,0; OVER 1; INK
c3; PAPER 4;a$;AT 19,0;b$;AT 18,
2; INK sad;"B"
 150 LET n=INT (RND*18)+1
 160 FOR f=12 TO 18 STEP 3: PRIN
T AT f,6;(f/3)-3;: GO SUB (8000+
n+((f/4)-3)): PRINT n$: PRINT AT
 f,27;"/1": NEXT f
 170 GO SUB 7000
 172 FOR f=0 TO 1: FOR g=1 TO 16
: PRINT AT f,g;"(sp)": NEXT g: N
EXT f: PAUSE 25
 175 FOR f=12 TO 18 STEP 3: FOR
g=6 TO 29: PRINT AT f,g; PAPER 4
;"(sp)": NEXT g: NEXT f
 180 LET a=0: LET b=0: LET c=0
 200 PRINT AT 12,a; INK c1; PAPE
R 4;a$;AT 13,a;b$;AT 12,a+2; INK
 sad;"B"
 205 BEEP .006,-15
 210 PRINT AT 15,b; INK c2; PAPE
R 4;a$;AT 16,b;b$;AT 15,b+2; INK
 sad+1;"B"
 220 PRINT AT 18,c; INK c3; PAPE
R 4;a$;AT 19,c;b$;AT 18,c+2; INK
 sad;"B"
 230 LET a=a+RND*1: LET b=b+RND*
1: LET c=c+RND*1
 240 IF a>27 THEN  PRINT AT 12,2
7; PAPER 4;"(sp)";AT 13,27;"(sp)
": LET a=28
 250 PRINT AT 12,a; INK c1; PAPE
R 4;a$;AT 13,a;c$;AT 12,a+2; INK
 sad;"B"
 255 IF a=28 THEN  GO TO 1000
 260 IF b>27 THEN  PRINT AT 15,2
7; PAPER 4;"(sp)";AT 16,27;"(sp)
": LET b=28
 265 BEEP .013,-14
 270 PRINT AT 15,b; INK c2; PAPE
R 4;a$;AT 16,b;c$;AT 15,b+2; INK
 sad+1;"B"
 275 IF b=28 THEN  GO TO 1050
 280 IF c>27 THEN  PRINT AT 18,2
7; PAPER 4;"(sp)";AT 19,27;"(sp)
": LET c=28
 290 PRINT AT 18,c; INK c3; PAPE
R 4;a$;AT 19,c;c$;AT 18,c+2; INK
 sad;"B"
 295 IF c=28 THEN  GO TO 1100
 300 BEEP .006,-15
 350 LET a=a+RND: LET b=b+RND: L
ET c=c+RND: GO TO 200
1000 FOR g=1 TO 10: PRINT AT 13,
g;" THE WINNER ! ! !": BEEP .01,
40: BEEP .01,30+g: NEXT g: BEEP
.5,20
1010 IF bet=1 THEN  LET money=mo
ney+(stake+(stake*odd1))
1020 PRINT AT 1,28;money
1030 GO TO 25
1050 FOR g=1 TO 10: PRINT AT 16,
g;" THE WINNER ! ! !": BEEP .01,
```

continued on page 72

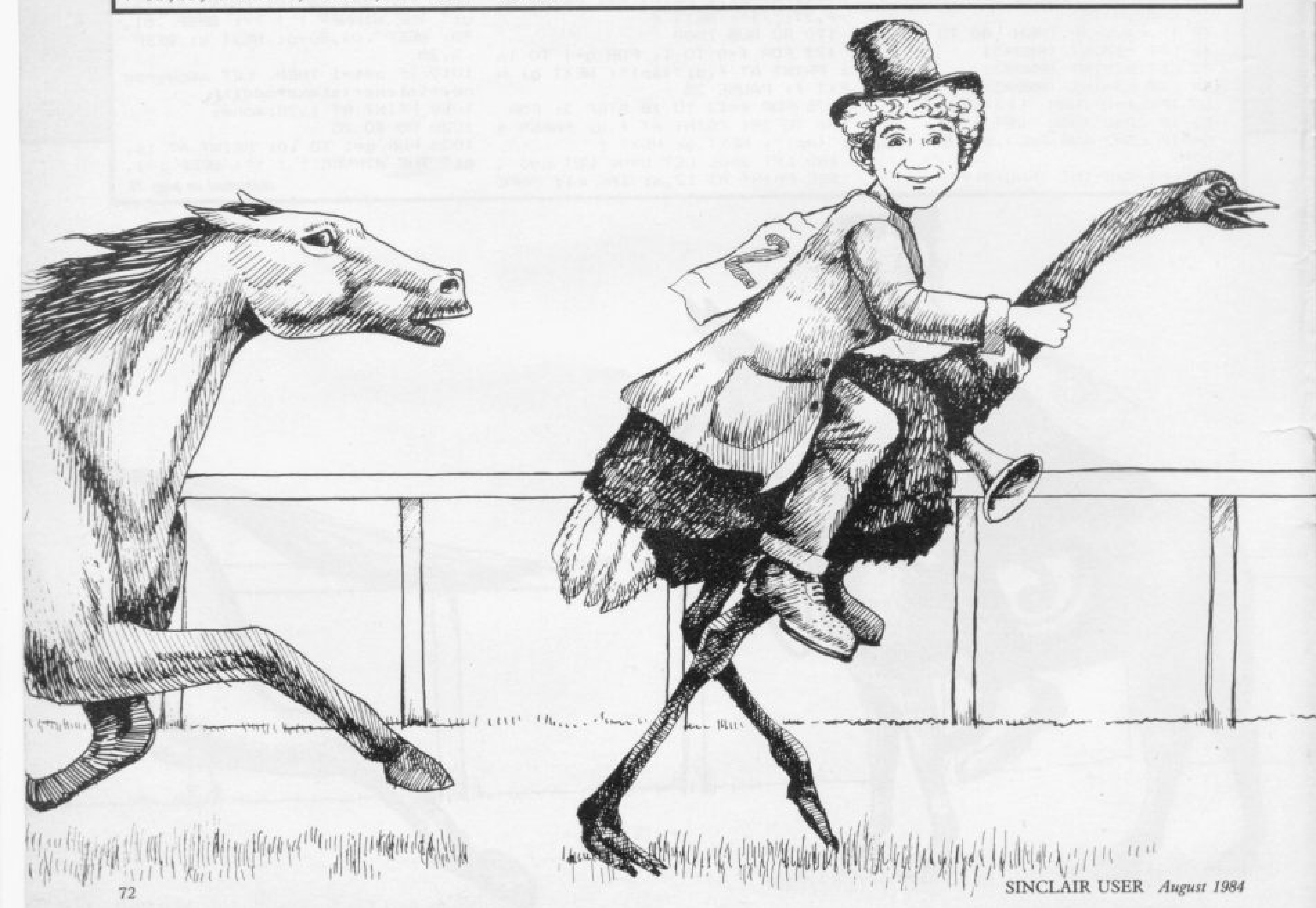


continued from page 71

```
40: BEEP .01,30+g: NEXT g: BEEP
.5,15
1060 IF bet=2 THEN  LET money=mo
ney+(stake+(stake*odd2))
1070 PRINT AT 1,28;money
1080 GO TO 25
1100 FOR g=1 TO 10: PRINT AT 19,
g;" THE WINNER ! ! !": BEEP .01,
40: BEEP .01,30+g: NEXT g: BEEP
.5,10
1110 IF bet=3 THEN  LET money=mo
ney+(stake+(stake*odd3))
1120 PRINT AT 1,28;money
1130 GO TO 25
7000 LET odd1=INT (RND*5)+2
7010 LET odd2=INT  (RND*5)+2
7020 LET odd3=INT  (RND*5)+2
7022 IF odd1=6 THEN  LET odd1=7
7024 IF odd2=4 AND RND>.5 THEN
LET odd2=8
7026 IF odd3=5 AND RND>.6 THEN
LET odd3=9
7030 PRINT AT 12,26;odd1;AT 15,2
6;odd2;AT 18,26;odd3
7100 PRINT AT 0,1;"Do you wish t
o";AT 1,1;"place a bet y/n?"
7110 IF INKEY$="y" OR INKEY$="Y"
 THEN  BEEP .25,10: GO TO 7130
7120 IF INKEY$="n" OR INKEY$="N"
 THEN  BEEP .25,10: LET bet=0: G
O TO 172
7125 GO TO 7110
7130 PRINT AT 0,1;"Which horse(3
*sp)";AT 1,1;"1, 2, or 3 ?    "
7140 IF INKEY$="1" THEN  PRINT A
T 12,31; PAPER 4; INK 7;"*": LET
 bet=1: GO TO 7200
7150 IF INKEY$="2" THEN  PRINT A
T 15,31; PAPER 4; INK 7;"*": LET
 bet=2: GO TO 7200
7160 IF INKEY$="3" THEN  PRINT A
T 18,31; PAPER 4; INK 7;"*": LET
 bet=3: GO TO 7200
7170 GO TO 7140
7200 BEEP .25,10: PRINT AT 0,1;"
How much do you ";AT 1,1;"want t
o bet ?(3*sp)"
7210 INPUT stake
7220 IF stake>money THEN  BEEP .
3,-10: PRINT AT 0,1;"Not enough
money";AT 1,1;"(3*sp)Try again(3
*sp)": GO TO 7210
7230 LET money=money-stake
7240 PRINT AT 1,28;"(4*sp)";AT 1
,28;money
7250 PRINT AT 0,1;"(16*sp)";AT 1
,1;"(16*sp)": RETURN
8001 LET n$=" SATURDAYS BOY ": R
ETURN
8002 LET n$=" SAINT PATRICK ": R
ETURN
8003 LET n$=" DIETOVER ": RETURN
8004 LET n$=" QUEEN & COUNTRY ":
 RETURN
8005 LET n$=" MR POPPY ": RETURN
8006 LET n$=" PINKYS BARN ": RET
URN
8007 LET n$=" CHIMNEY SWEEP ": R
ETURN
8008 LET n$=" MICRO-CHIP ": RETU
RN
8009 LET n$=" TAXI FARE ": RETUR
N
8010 LET n$=" PURPLE JIM ": RETU
RN
8011 LET n$=" ALADDIN ": RETURN
8012 LET n$=" TEXAS BORN ": RETU
RN
8013 LET n$=" BRICK A BRACK ": R
ETURN
8014 LET n$=" JAM AND BREAD ": R
ETURN
8015 LET n$=" FIFTY GUINEAS ": R
ETURN
8016 LET n$=" WONDERFUL WILF ":
RETURN
8017 LET n$=" BOB A JOB ": RETUR
N
8018 LET n$=" RACE EM ALL ": RET
URN
8019 LET n$=" LONDON BRIDGE ": R
ETURN
8020 LET n$=" MOON MAN ": RETURN

8999 STOP
9000 FOR f=1 TO 11: FOR n=0 TO 7
: READ a: POKE USR CHR$ (143+f)+
n,a: NEXT n: NEXT f
9010 DATA 0,0,0,0,0,0,31,127,0,0
,0,0,1,255,255,255,160,160,112,2
16,252,254,239,194
9020 DATA 159,159,152,40,40,40,7
2,144,255,255,0,0,0,0,1,0,192,19
2,160,80,72,68,132,8
9030 DATA 159,159,152,20,10,9,9,
5,255,255,1,2,20,25,2,4,192,128,
128,128,128,0,0,0
9040 DATA 24,60,126,86,126,36,60
,66,0,255,102,102,102,255,102,10
2
9050 RETURN
9900 FOR f=40 TO -10 STEP -2: BE
EP .01,f: BEEP .01,f+10: NEXT f
9910 PAPER 5: CLS : PRINT AT 1,0
;"(sp)You have run out of money
you(3*sp)will now have to walk h
ome.(4*sp)"
9920 GO TO 9970
9950 FOR f=40 TO -10 STEP -2: BE
EP .01,f: BEEP .01,f+10: NEXT f

9960 PAPER 5: CLS : PRINT AT 1,0
;"(sp)That was the last race of
the(3*sp)day. You have £";money
9970 PRINT AT 20,2;"Press any ke
y to play again"
9980 PAUSE 0: GO TO 10
```



CHARACTER

CHARACTER, by Jacob Wittrock of Farum, Denmark is a utility program to enable you to create user-defined graphics with a minimum of blood and tears. You may re-define any of the characters with code numbers from 32 to 127 — see Appendix A of the Spectrum Manual for a list of those. The program stores the new characters above RAMTOP in 770 bytes starting at address 50000 and that code may be saved to tape.

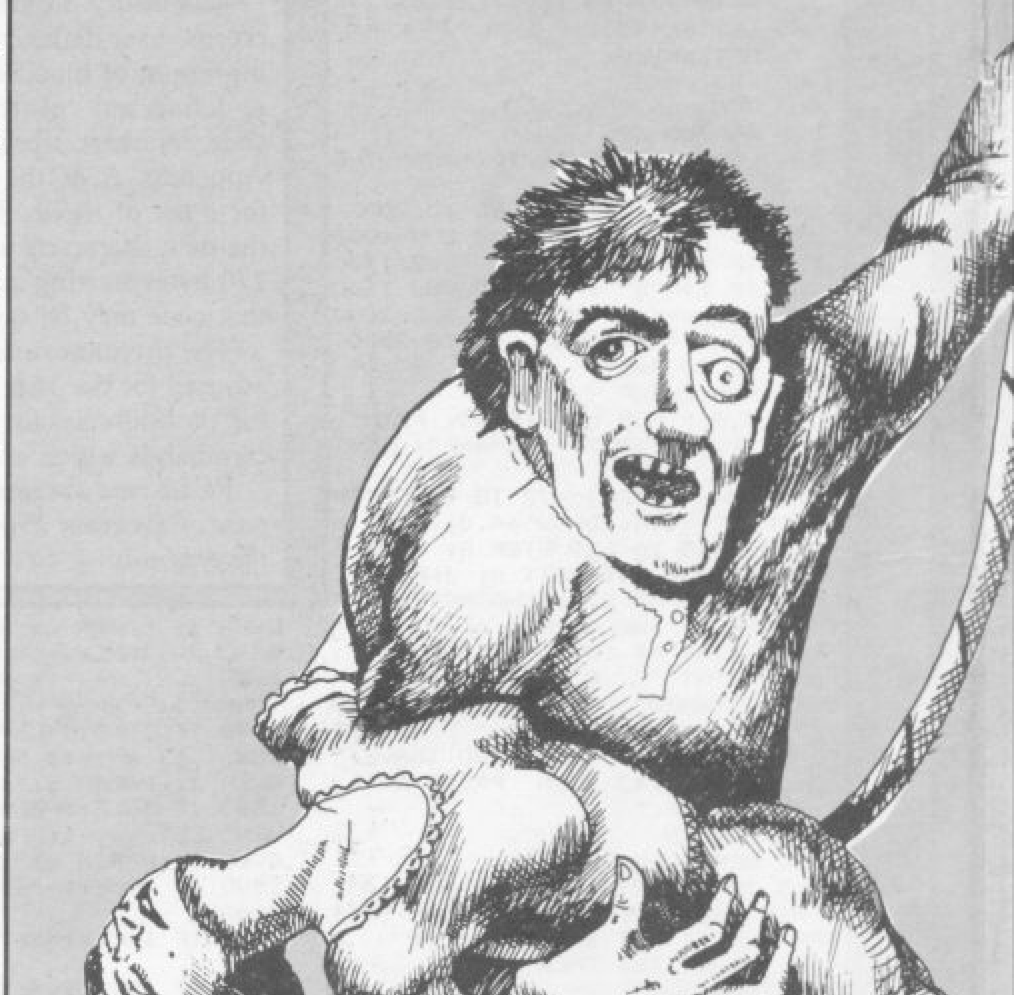
The program runs in 48K but can be adapted for the 16K Spectrum by altering the addresses for RAMTOP and the commands which access the code.

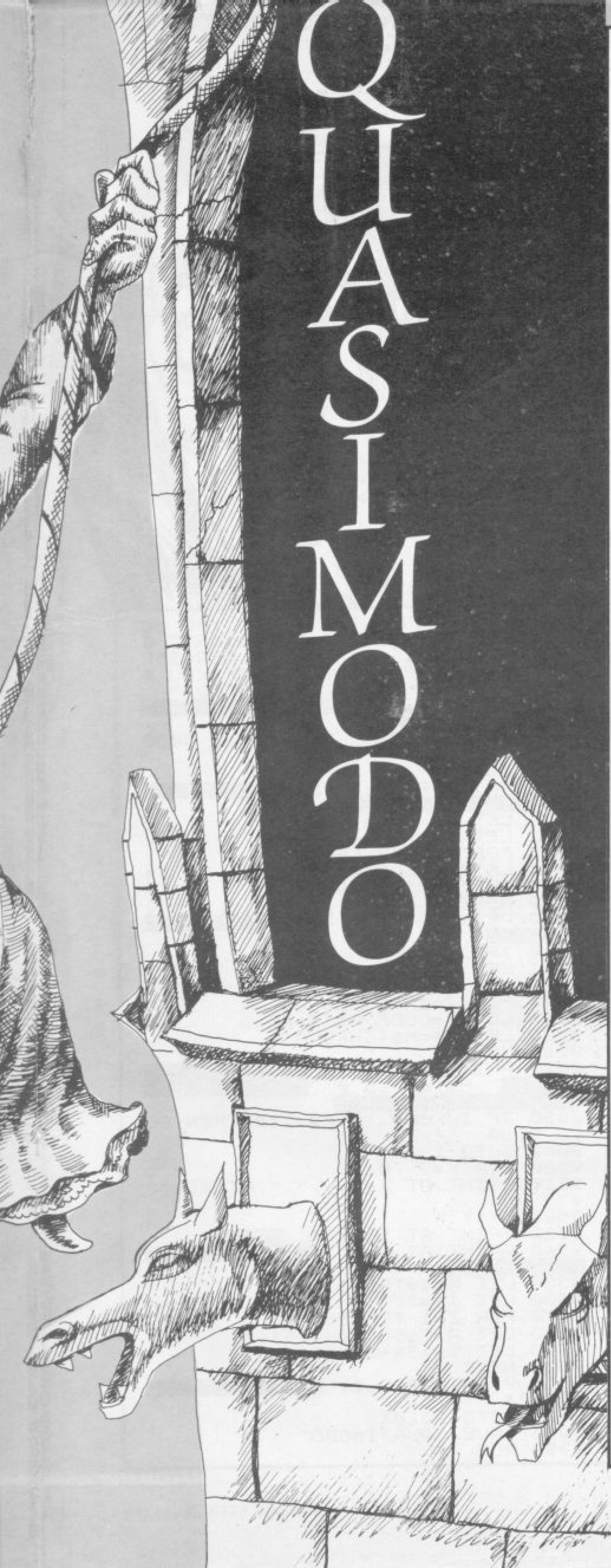
Please read the instructions on the first page of Program Printout before entering the program.

```
?  10 CLEAR 49999
  15 BORDER 1: PAPER 1: INK 7: C
LS : PRINT AT 10,10;"LOAD DATA?"
  16 LET i$=INKEY$: IF I$="n" TH
EN  GO TO 19
  17 IF i$="y" THEN  PRINT AT 10
,10;" LOADING! "''': LOAD ""CODE
 : LOAD "code"CODE : GO TO 60
  18 GO TO 16
  19 PRINT AT 10,10;"PLEASE WAIT
!"
  20 FOR n=15616 TO 16384
  30 POKE n+34384,PEEK n
  40 NEXT n
  50 POKE 23606,80: POKE 23607,1
94
  60 PRINT AT 10,10;"(12*sp)"
  70 LET chs=50000
  75 LET ad=chs
  80 LET ch=32
 200 REM run
 220 GO SUB 500
 260 LET i$=INKEY$: IF i$="" THE
N  GO TO 260
 270 IF i$="c" THEN  GO TO 200
 280 IF i$="f" THEN  GO SUB 1000
 290 IF i$="b" THEN  GO SUB 1100
 300 IF i$="g" THEN  GO SUB 1500
 310 IF i$="p" THEN  GO SUB 2000
 320 IF i$="e" THEN  GO TO 2500
 330 GO TO 260
 500 REM CLEAR
 510 CLS : FOR n=4 TO 13: PRINT
AT n,11; PAPER 7;"(10*sp)": NEXT
 n
 520 INK 0: FOR n=72 TO 136 STEP
 8: PLOT 95,n: DRAW 64,0: NEXT n
: FOR n=95 TO 159 STEP 8: PLOT n
,72: DRAW 0,64: NEXT n: INK 7
 530 PRINT AT 2,1;"CHARACTER : "
; PAPER 6; INK 0;CHR$ ch
 540 PRINT AT 15,0;"PRESS:"
 550 PRINT "   F - FORWARD"'"
B - BACKWARD"'"   C - CLEAR GRID
"'"   G - ENTER GRID"'"   P - PI
CK UP CHAR."'"   E - END (SAVE)"
 560 IF ch>143 THEN  PRINT AT 1,
1;"USER DEF."
 570 RETURN
1000 REM FORWARD
1005 IF ch=127 THEN  LET ch=143:
 PRINT AT 1,1; PAPER 1; INK 7;"U
SER DEF.": LET ad=USR "a"-8
1010 IF ch>163 THEN  BEEP .3,-30
: RETURN
1020 LET ch=ch+1: LET ad=ad+8
1030 BEEP .01,30
1040 PRINT AT 2,13; PAPER 6; INK
 0;CHR$ ch
1050 RETURN
1100 REM BACKWARD
1105 IF ch=144 THEN  LET ch=128:
 PRINT AT 1,1; PAPER 1; INK 7;"(
9*sp)": LET ad=50768
1110 IF ch<33 THEN  BEEP .3,-30:
 RETURN
1120 LET ch=ch-1: LET ad=ad-8
1130 GO TO 1030
1500 REM ENTER GRID
1501 PRINT AT 19,3; OVER 1;"(ig8
)"
1503 PRINT AT 21,12;"POKE"
1505 LET x=4: LET y=11
1510 PAPER 7: INK 0
1520 IF INKEY$="7" THEN  PRINT A
T x,y; OVER 1;"(sp)": LET x=x-1+
(x<5)
1525 IF INKEY$="6" THEN  PRINT A
T x,y; OVER 1;"(sp)": LET x=x+1-
(x>12)
1530 IF INKEY$="8" THEN  PRINT A
T x,y; OVER 1;"(sp)": LET y=y+1-
(y>19)
1535 IF INKEY$="5" THEN  PRINT A
T x,y; OVER 1;"(sp)": LET y=y-1+
(y<12)
1540 PRINT AT x,y; OVER 1; PAPER
 2;"(sp)"
1545 PAUSE 5
1546 LET o=0
1547 IF x=4 OR x=13 OR y=11 OR y
=20 THEN  LET o=7
1550 IF INKEY$=CHR$ 11 AND x>4 T
HEN  LET x=x-1: PRINT AT x+1,y;
OVER 1; PAPER o;"(sp)"
1560 IF INKEY$=CHR$ 10 AND x<13
THEN  LET x=x+1: PRINT AT x-1,y;
 OVER 1; PAPER o;"(sp)"
1570 IF INKEY$=CHR$ 9 AND y<20 T
HEN  LET y=y+1: PRINT AT x,y-1;
OVER 1; PAPER o;"(sp)"
1580 IF INKEY$=CHR$ 8 AND y>11 T
HEN  LET y=y-1: PRINT AT x,y+1;
OVER 1; PAPER o;"(sp)"
1590 IF INKEY$="p" THEN  GO SUB
2000
1592 IF INKEY$="e" THEN  GO TO 1
610
1594 IF INKEY$="c" THEN  PAPER 1
: INK 7: GO SUB 500: PRINT AT 21
,12;"POKE";AT 19,3; OVER 1;"(ig8
)": PAPER 7: INK 0
1596 IF INKEY$="f" THEN  GO SUB
1000
1598 IF INKEY$="b" THEN  GO SUB
1100
1600 GO TO 1520
1610 PRINT AT x,y; OVER 1;"(sp)"
1613 PAPER 1: INK 7
1615 LET c=0
1620 FOR p=22700 TO 22924 STEP 3
2
1630 LET b=0
1640 IF PEEK p=0 THEN  LET b=b+1
28
1650 IF PEEK (p+1)=0 THEN  LET b
=b+64
1660 IF PEEK (p+2)=0 THEN  LET b
=b+32
1670 IF PEEK (p+3)=0 THEN  LET b
=b+16
1680 IF PEEK (p+4)=0 THEN  LET b
=b+8
1690 IF PEEK (p+5)=0 THEN  LET b
=b+4
1700 IF PEEK (p+6)=0 THEN  LET b
=b+2
1710 IF PEEK (p+7)=0 THEN  LET b
=b+1
1720 POKE ad+c,b
1725 LET c=c+1
1730 NEXT p
1740 PRINT AT 2,13; PAPER 6; INK
 0;CHR$ ch
1745 PRINT AT 21,12;"SAVE"
1750 PRINT AT 19,3; OVER 1;"(ig8
)": RETURN
2000 REM PICK UP CH.
2005 PRINT AT 20,3; INK 7; PAPER
 1; OVER 1;"(ig8)"
2010 PRINT  INK 1; PAPER 1;AT 21
,0;CHR$ ch
2020 FOR n=7 TO 0 STEP -1
2030 FOR l=0 TO 7
2035 IF ATTR (12-l,12+n)=0 AND P
OINT (n,l)=0 THEN  PRINT AT 12-l
,12+n; OVER 1; PAPER 7; INK 0;"(
sp)"
2040 IF POINT (n,l)=1 THEN  PRIN
T  PAPER 0; INK 0; OVER 1;AT 12-
l,12+n;"(sp)"
2050 NEXT l
2060 NEXT n
2065 PRINT AT 20,3; PAPER 1; INK
 7; OVER 1;"(ig8)"
2070 RETURN
2500 REM END
2510 FOR n=15 TO 21
2520 PRINT AT n,0;"(20*sp)"
2530 NEXT n
2540 INPUT "SAVE characters?"; L
INE s$
2550 IF s$(1)<>"y" AND s$(1)<>"Y
" THEN  GO TO 2600
2560 INPUT "Name ?";n$
2561 IF LEN n$>10 OR n$="" THEN
 GO TO 2560
2565 INPUT "Name of user def. ?"
;u$: IF LEN u$>10 OR u$="" THEN
 GO TO 2565
2570 PRINT AT 15,0;"The new char
acterset is lying   from address
 50000 to 50770.The SAVEing is i
n tree parts: the   1'st part SA
VEs the characters, the 2'nd par
t moves the ch.set  into the RAM
 and the 3'rd SAVEs the USER DEF
INED CHARACTERS."
2580 SAVE n$CODE chs,770: SAVE "
code"CODE 23606,2: SAVE u$CODE U
SR "a",168
2590 FOR n=15 TO 21
2593 PRINT AT n,0;"(32*sp)"
2595 NEXT n
2600 INPUT "Another go?"; LINE g
$
2610 IF g$(1)="y" OR g$(1)="Y" T
HEN  GO TO 70
9997 STOP
9998 POKE 23606,0: POKE 23607,60
9999 SAVE "Character" LINE 1
```

```
   2 LET HS=0
   3 GOTO 8000
   4 LET S=0
   5 FOR F=8 TO 21
   6 PRINT AT F,0;"████████████████
████████████████"
   7 NEXT F
   8 FOR F=43 TO 30 STEP -1
   9 PLOT 60,F
  10 NEXT F
  11 PRINT AT 0,29;"▛▜▛ ";TAB 29;
"▐▐▐"
  12 LET X=7
  13 LET Y=1
  14 LET A=31
  15 PRINT AT X,Y;" "
  16 IF X<>7 THEN GOSUB 141
  20 LET Y=Y+(INKEY$="8")-(INKEY
$="5")
  30 PRINT AT X,Y;"*"
  40 IF INKEY$="0" THEN GOSUB 10
0
  50 PRINT AT 7,A;" "
  51 IF A=0 THEN LET A=31
  70 LET A=A-1
  71 IF A=Y AND X=7 THEN GOTO 90
00
  80 PRINT AT 7,A;"O"
  90 GOTO 15
 100 LET X=X-1
 101 LET Y=Y+1
 110 PRINT AT X+1,Y-1;" ";AT X,Y
;"*"
 120 IF Y=30 THEN GOTO 150
 130 PRINT AT X,Y;" "
 140 RETURN
 141 LET X=X+1
 142 LET Y=Y+1
 143 RETURN
 150 PRINT AT 7,7;"WELL DONE"
 155 LET S=S+INT (RND*100)+50
 160 PRINT AT 0,0;"SCORE = ";S
 170 FOR F=1 TO 50
 180 NEXT F
 199 LET B=1
 200 FOR F=0 TO 7
 210 PRINT AT F,0;"
                    "
 220 NEXT F
 230 FOR F=43 TO 30 STEP -1
 240 PLOT 60,F
 250 NEXT F
 260 FOR F=8 TO 15
 270 PRINT AT F,5;"     ";TAB 15;"
     ";TAB 25;"  "
 280 NEXT F
 290 PRINT AT 0,29;"▛▜▛ ";TAB 29;
"▐▐▐"
 300 LET X=7
 310 LET Y=1
 320 LET A=31
 330 PRINT AT X,Y;" "
 340 LET Y=Y+(INKEY$="8")-(INKEY
$="5")
 345 IF INKEY$="0" THEN GOSUB 40
0 AND Y<30
 346 IF X<>7 AND INKEY$="" THEN
GOSUB 430
 347 IF X=7 AND (Y=6 OR Y=7 OR Y
=5 OR Y=15 OR Y=16 OR Y=17 OR Y=
18 OR Y=19 OR Y=25 OR Y=26) THEN
 GOTO 9500
 348 IF INKEY$="0" AND B=0 THEN
GOTO 9000
 350 PRINT AT X,Y;"*"
 360 PRINT AT 7,A;" "
 365 IF A=0 THEN LET A=31
 370 IF A=Y AND X=7 THEN GOTO 90
00
 380 LET A=A-1
 390 PRINT AT 7,A;"O"
 395 GOTO 330
 400 LET X=X+-1
 401 LET B=1
 410 LET Y=Y+1
 415 IF Y=30 THEN GOTO 460
```

QUASIMODO for the 16K ZX-81 by 13-year-old Terry Robinson of Edinburgh is a version of the classic arcade game **Hunchback.** You are Quasimodo and have to rescue your sweetheart by leaping over the battlements and ringing the bells of Notre Dame cathedral. The version includes barrels, jumping the pits, and swinging on the bell ropes. There are four levels and a hi-score routine. A campanologists' delight.






```
420 RETURN
421 LET B=0
430 LET X=X+1
440 LET Y=Y+1
445 IF INKEY$="0" THEN GOTO 900
0
450 RETURN
460 IF X<6 THEN GOTO 9000
470 PRINT AT X,Y;"*"
480 PRINT AT 7,7;"WELL DONE"
490 LET S=S+INT (RND*200)+100
495 PRINT AT 0,0;"SCORE = ";S
496 FOR F=0 TO 50
497 NEXT F
500 FOR F=0 TO 7
510 PRINT AT F,0;"
                              "
519 NEXT F
520 FOR F=8 TO 15
521 PRINT AT F,0;"
                              "
522 NEXT F
529 PRINT AT 8,0;
530 FOR F=8 TO 15
540 PRINT TAB 3;"    ";TAB 12;"
    ";TAB 22;"      "
550 NEXT F
560 FOR F=43 TO 30 STEP -1
570 PLOT 60,F
580 NEXT F
590 PRINT AT 0,29;"   ";TAB 29;
"   "
591 LET X=7
592 LET Y=1
595 LET A=31
596 LET B=0
600 PRINT AT X,Y;" "
601 PRINT AT 7,A;" "
602 IF A=0 THEN LET A=31
603 IF B=0 AND RND<.5 THEN LET
B=31
604 PRINT AT 6,B;" "
610 LET Y=Y+(INKEY$="8")-(INKEY
$="5")
611 IF INKEY$="0" THEN GOSUB 65
0
612 IF INKEY$="" AND X<>7 THEN
GOSUB 680
620 LET A=A-1
621 IF B<>0 THEN LET B=B-1
622 IF X=7 AND A=Y OR X=6 AND B
=Y THEN GOTO 9000
630 PRINT AT X,Y;"*";AT 7,A;"O"
631 IF B<>0 THEN PRINT AT 6,B;"
 "
632 IF X=7 AND (Y=4 OR Y=5 OR Y
=3 OR Y=13 OR Y=14 OR Y=15 OR Y=
16 OR Y=12 OR Y=23 OR Y=24 OR Y=
25 OR Y=26 OR Y=27 OR Y=22) THEN
GOTO 9500
640 GOTO 600
650 LET X=X-1
660 LET Y=Y+1
665 IF Y=30 THEN GOTO 700
670 RETURN
680 LET X=X+1
690 LET Y=Y+1
696 RETURN
700 PRINT AT 7,7;"WELL DONE"
705 LET S=S+INT (RND*300)+150
710 PRINT AT 0,0;"SCORE = ";S
720 FOR F=0 TO 50
730 NEXT F
740 FOR F=0 TO 15
750 IF F<=7 THEN PRINT AT F,0;"
"
760 IF F>7 THEN PRINT "
                              "
770 NEXT F
780 FOR F=8 TO 15
790 PRINT AT F,7;"
 "
800 NEXT F
810 FOR F=43 TO 30 STEP -1
```

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```
 820 PLOT 16,F
 830 PLOT 22,F
 840 PLOT 28,F
 850 PLOT 34,F
 860 PLOT 40,F
 870 PLOT 46,F
 880 NEXT F
 890 PRINT AT 0,7;"▛▛▛▛▛▛▛▛▛▛▛
▛▛▛"
 891 PRINT TAB 7;"▌▌▌▌▌▌▌▌▌▌▌▌▌▌
▌▌▌▌"
 892 LET X=7
 893 LET Y=1
 894 LET B=0
 895 LET A=31
 896 FOR F=43 TO 30 STEP -1
 897 PLOT 60,F
 898 NEXT F
 899 PRINT AT 0,29;"▛▛ ";TAB 29;
"▌▌▌"
 900 PRINT AT X,Y;" ";AT 6,B;" "
;AT 5,A;" "
 910 LET B=B+1
 920 IF B=31 THEN LET B=1
 930 LET A=A-1
 940 IF A=0 THEN LET A=31
 950 LET Y=Y+(INKEY$="8")-(INKEY
$="5")
 955 IF INKEY$="8" AND Y>7 AND Y
<24 THEN GOSUB 1200
 956 IF INKEY$="8" AND Y=25 OR Y
=26 AND INKEY$="8" THEN GOSUB 11
50
 960 IF INKEY$="0" THEN GOSUB 10
00
 961 IF Y=30 THEN GOTO 1220
 970 IF Y=A AND X=5 OR Y=B AND X
=6 THEN GOTO 9000
 980 PRINT AT X,Y;"*";AT 6,B;"█"
;AT 5,A;"█"
 981 IF X=7 AND Y>7 AND Y<24 THE
N GOTO 9500
 990 GOTO 900
1000 IF Y=6 OR Y=29 THEN GOTO 11
00
1010 LET X=X-1
1020 RETURN
1100 LET X=X-1
1110 LET Y=Y+1
1115 IF Y=30 THEN GOTO 1220
1120 RETURN
1150 LET X=X+1
1151 LET Y=Y+1
1152 IF X=5 AND Y=A OR X=6 AND Y
=B THEN GOTO 9000
1153 IF X=7 THEN RETURN
1154 PRINT AT X,Y;"*"
1155 PRINT AT X,Y;" "
1156 GOTO 1150
1200 LET Y=Y+3
1210 RETURN
1220 PRINT AT 7,7;"WELL DONE"
1221 LET S=S+INT (RND*400)+300
1230 PRINT AT 0,0;"YOUR S C O R
E IS ";S
1240 PRINT "YOU HAVE RESCUED ESM
ERALDA FROM THE CLUTCHES OF THE
GUARDS OF   NOTREDAME."
1250 PRINT "FOR ANOTHER GAME,PRE
SS ANY KEY"
1260 IF INKEY$="" THEN GOTO 1260
1270 GOTO 9020
8000 CLS
8001 PRINT "
IODOQUASIM"
8010 PRINT ,,,,"YOU HAVE TO MOVE
 ALONG THE WALL  JUMPING BARRELS
AND BIRDS TO      RESCUE ESMERALDA
.                 ON THE FIRST SCR
EEN YOU JUMP THEBARRELS TO GET T
O THE BELL AND  RING IT.ON THE S
ECOND LEVEL YOU JUMP HOLES AND B
```



```
ARRELS AND ON   THE THIRD,YOU JU
MP HOLES,BARRELSAND BIRDS.ON THE
 FOURTH LEVEL    YOU JUMP ACROSS
THE BELLS OVER   THE PIT.IF YOU G
ET HIT BY A BIRDYOU ARE DEAD."
8020 PRINT ,,"PRESS ANY KEY TO B
EGIN THE GAME"
8030 IF INKEY$="" THEN GOTO 8030
8035 CLS
8040 GOTO 4
9000 PRINT AT 7,0;"HARD LINES YO
U HAVE BEEN KILLED"
9001 LET A$=STR$ S
9002 LET S$=""
9003 FOR I=1 TO LEN A$
9004 LET A=CODE A$(I)+128
9008 LET S$=S$+CHR$ A
9009 NEXT I
9010 PRINT AT 9,0;"        YOUR SCO
RE WAS ";S$
9020 IF S>HS THEN LET HS=S
9021 LET A$=STR$ HS
9022 LET H$=""
9023 FOR I=1 TO LEN A$
9024 LET A=CODE A$(I)+128
9025 LET H$=H$+CHR$ A
9026 NEXT I
9027 PRINT AT 11,0;"THE HIGH SCO
RE IS ";H$;AT 13,0;"PRESS NEWLIN
E FOR ANOTHER GAME"
9030 IF INKEY$<>CHR$ 118 THEN GO
TO 9030
9040 GOTO 1
9500 FOR X=7 TO 15
9510 PRINT AT X-1,Y;" ";AT X,Y;"
*"
9520 NEXT X
9530 PRINT AT 15,Y-2;"SPLAT"
9540 PRINT AT 7,0;"HARD LINES YO
U ARE DEAD"
9550 LET A$=STR$ S
9560 LET S$=""
9570 FOR I=1 TO LEN A$
9580 LET A=CODE A$(I)+128
9590 LET S$=S$+CHR$ A
9600 NEXT I
9610 PRINT AT 9,0;"YOUR SCORE WA
S";S$
9620 GOTO 9020
9998 SAVE "QUASIMODO"
9999 RUN
```

DEFENDER



```
  50 INK 7: PAPER 0: BORDER 0: C
LS
  60 GO SUB 9000
  70 GO SUB 8000
  80 PRINT AT 0,0; PAPER 2; INK
6;"(sp)SCORE 0(8*sp)HI-SCORE 0(6
*sp)"
  90 LET hi=0
 100 GO SUB 4000
 110 BEEP 1,30: PRINT AT 2,10; F
LASH 1;"ALIEN ALERT": PAUSE 100:
 PRINT AT 2,10;"(11*sp)": PAUSE
50
 120 LET sc=0
 130 LET p=15: LET q=1: LET f=0:
 LET g=1
 140 LET v=1: LET w=1: LET h=1:
LET i=1
 150 LET x=15: LET y=20
 160 LET a=x: LET b=y
 170 LET y=y-(INKEY$="q" AND y>3
)+(INKEY$="a" AND y<20)
 180 LET x=x-(INKEY$="o" AND x>0
)+(INKEY$="p" AND x<31)
 190 IF ATTR (y,x)=5 THEN  BEEP
.01,40
 200 PRINT AT b,a;"(sp)";AT y,x;
 INK 7;"A"
 210 PRINT AT q,p;"(sp)";AT q,p-
1;"(sp)"
 220 IF INKEY$="z" THEN  PRINT A
T y-1,x; INK 5;"CC"
 240 LET p=p+v: LET q=q+w
 250 IF p=31 OR p=0 THEN  LET v=
-v: BEEP .01,15
 260 IF q=1 THEN  LET w=-w: BEEP
 .01,15
 270 IF ATTR (q,p)=5 THEN  BEEP
.01,50: GO SUB 3000
 280 IF ATTR (q,p)=4 THEN  GO TO
 7000
 290 PRINT AT q,p; INK 6;"B"
 300 IF sc<500 THEN  GO TO 380
 310 PRINT AT g,f;"(sp)";AT g,f-
1;"(sp)"
 320 LET f=f+h: LET g=g+i
 330 IF f=31 OR f=0 THEN  LET h=
-h: BEEP .01,15
 340 IF g=1 THEN  LET i=-i: BEEP
 .01,15
 350 IF ATTR (g,f)=5 THEN  BEEP
.01,50: GO SUB 3500
 360 IF ATTR (g,f)=4 THEN  GO TO
 7000
 370 PRINT AT g,f; INK 6;"B"
 380 LET sc=sc+1: PRINT AT 0,7;
PAPER 2; INK 6;sc
 390 GO TO 160
 400 IF sc>=hi THEN  LET hi=sc:
PRINT AT 0,25; PAPER 2; INK 6;hi
: PRINT AT 0,7; PAPER 2; INK 6;"
0(6*sp)"
 410 FOR z=1 TO 20
 420 PRINT AT z,0; INK 0;"(32*ig
8)"
 430 NEXT z
 440 GO TO 100
3000 LET v=v: LET w=-w
3010 IF q=21 OR q=0 THEN  LET w=
-w
3020 RETURN
3500 LET h=h: LET i=-i
3510 IF g=21 OR g=1 THEN  LET i=
-i
3520 RETURN
4000 FOR s=1 TO 30: FOR t=5 TO 1
5 STEP 2
4010 PRINT AT t,s; INK 5;"C": BE
EP .01,s
4030 NEXT t: NEXT s
```

DEFENDER by P Watson for the 16K Spectrum is a variant on the old favourite Breakout. In **Defender** you have to build the wall which the alien creatures are bent on destroying. If you want to repair the outer edge of the wall, you will have to break through part of it and unless you are cunning the aliens may take advantage of the cleared space.

The game uses special graphics characters, so please read the instructions at the beginning of Program Printout.

```
4040 FOR j=0 TO 31
4050 PRINT AT 21,j; INK 4;"D": B
EEP .01,2*j
4060 NEXT j
4070 PRINT AT 2,10; INK 0;"(9*ig
8)"
4080 RETURN
7000 IF ATTR (q,p)=4 THEN  PRINT
 ; INK 6; BRIGHT 1;AT q-1,p-1;"F
HJ";AT q-2,p-1;"EGI": BEEP .5,1:
 BEEP .5,1: BEEP 2,-2: PRINT AT
q-1,p-1; INK 0;"(3*ig8)";AT q-2,
p-1; INK 0;"(3*ig8)"
7010 IF ATTR (g,f)=4 THEN  PRINT
 ; INK 6; BRIGHT 1;AT g-1,f-1;"F
HJ";AT g-2,f-1;"EGI": BEEP .5,1:
 BEEP .5,1: BEEP 2,-2: PRINT AT
g-1,f-1; INK 0;"(3*ig8)";AT g-2,
f-1; INK 0;"(3*ig8)"
7020 PRINT AT 21,0; PAPER 4; INK
 7; BRIGHT 1; FLASH 1;"DDDDDDDDD
DDDDDDDDDDDDDDDDDDDDDDD"
7030 PRINT AT 3,11; PAPER 1; INK
 7; FLASH 1;"GAME OVER"
7040 FOR b=60 TO -20 STEP -2
7050 BEEP .01,b
7060 NEXT b
7070 INPUT "(4*sp)Another game?
(y or n) "; LINE a$
7080 IF a$="y" OR a$="Y" THEN  G
O TO 400
7090 IF a$="n" OR a$="N" THEN  C
LS : GO TO 7110
7100 IF a$<>"y" OR a$<>"Y" OR a$
<>"n" OR a$<>"N" THEN  GO TO 707
0
7110 PRINT '' INK RND*6;TAB RND*
15;"OK, BYE FOR NOW!": POKE 2369
2,255: GO TO 7110
8000 BEEP .1,30: PRINT AT 0,8; I
NK 5;"D E F E N D E R"
8010 PRINT AT 2,0; BRIGHT 1; INK
 3;"How long can poor Joe defend
 theEarth against the nasty anti
-   matter aliens "; BRIGHT 0; I
NK 6;" "; BRIGHT 1; INK 3;" who
 are destroy-ing the protective
force-field?"
8020 PRINT AT 7,0; INK 4;"He can
 restore the force field  using
his energy gun and also   pass t
hrough it,but this causes danger
ous gaps!!"
8030 PRINT AT 12,0; INK 3; BRIGH
T 1;"Can he cope with the second
     alien...."
8040 PRINT AT 15,12; INK 2; BRIG
HT 1;"Controls"
8050 PRINT AT 17,1; INK 6;"Up   D
own  Left  Right  Restore
                           "; IN
K 5;"Q     A     O     P      Z
"
8060 PRINT )0;AT 1,3; PAPER 1; I
NK 7; FLASH 1;" Press any key to
 play... "
8070 PAUSE 0: CLS
8080 RETURN
9000 FOR n=1 TO 10
9010 READ a$
9020 FOR p=0 TO 7
9030 READ q: POKE USR a$+p,q
9040 NEXT p
9050 NEXT n
9060 DATA "A",3,27,27,15,63,27,1
20,64,"B",66,60,90,126,126,90,66
,36,"C",28,34,73,89,77,73,34,28,
"D",241,159,241,159,241,159,241,
159,"E",0,0,2,2,9,37,16,8,"F",10
0,2,225,24,70,0,252,0,"G",16,146
,84,84,85,17,130,130,"H",84,84,1
7,186,124,124,254,16,"I",0,0,128
,128,32,72,16,32,"J",76,128,14,4
8,196,0,126,0
9070 RETURN
9990 CLS : SAVE "defender" LINE
1
9995 PRINT AT 10,0;"Re-wind tape
 then run to VERIFY."
9997 VERIFY "defender"
9999 PRINT AT 10,0; INK 3; BRIGH
T 1;"(9*sp)Tape Verified.(9*sp)"
 : STOP
```

DIVER

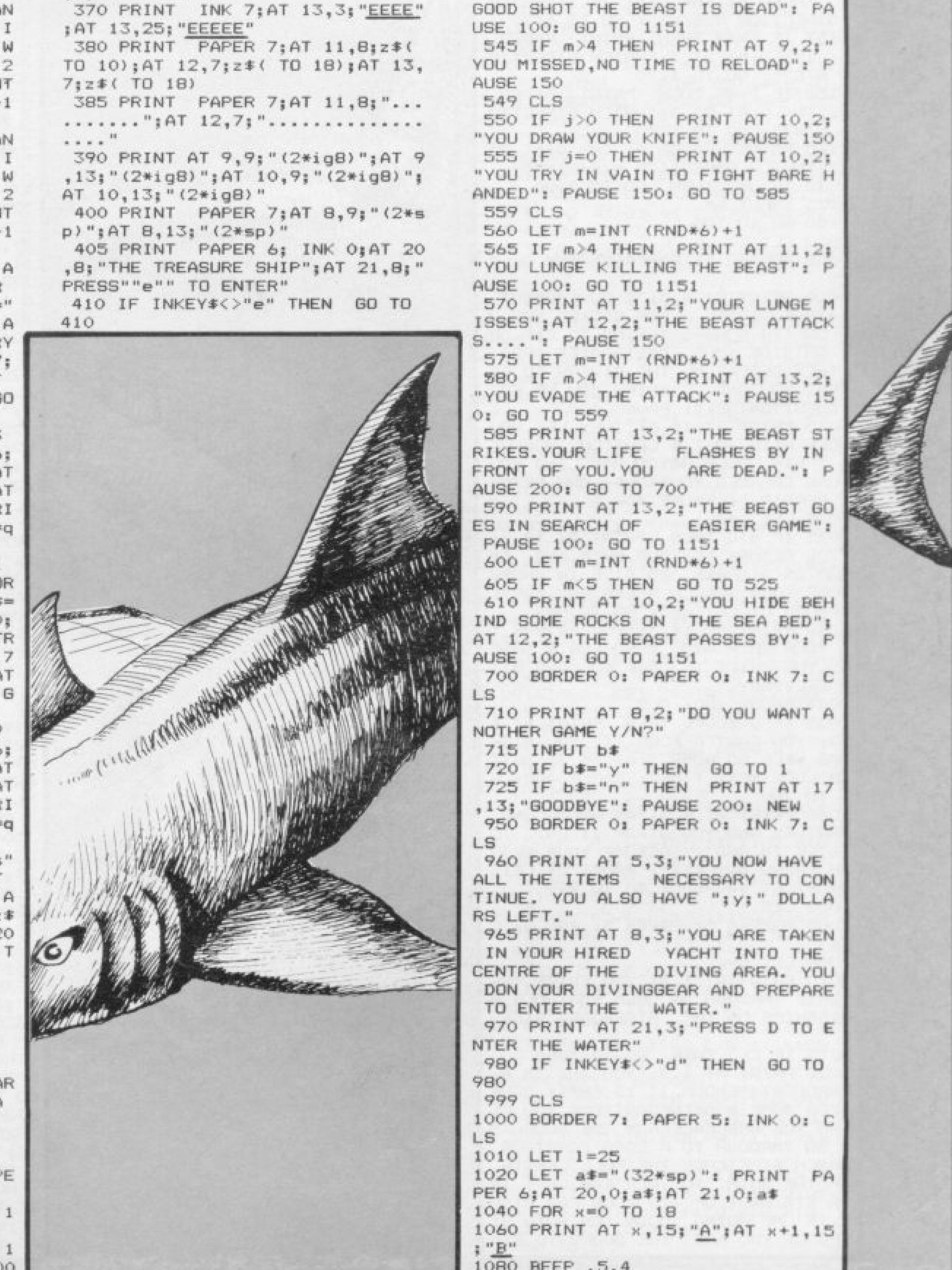


CONTINUING our series of Cambridge Award programs we present **Diver** for the 48K Spectrum. Your task is to organise a salvage expedition and search wrecked ships to find treasure. Fearsome denizens of the deep threaten your survival. Diver was written by Paul Caris of Harlington, Bedfordshire.

This game uses special graphics characters explained in the instructions on page 67.

```
   1 BORDER 5: PAPER 1: INK 7: C
LS
   2 PRINT AT 5,14;"DIVER";AT 7,
15;"BY";AT 9,12;"PAUL CARIS": PA
USE 50
   3 BEEP .125,5: BEEP .08,5: BE
EP .08,10: BEEP .08,10: BEEP .25
,10: BEEP .125,12: BEEP .375,14
   4 BEEP .08,10: BEEP .08,12: B
EEP .08,14: BEEP .08,14: BEEP .0
8,14: BEEP .25,15: BEEP .125,14:
 BEEP .375,12
   5 BEEP .125,9: BEEP .25,5: BE
EP .125,9: BEEP .25,12: BEEP .12
5,14: BEEP .375,15
   6 BEEP .08,3: BEEP .08,5: BEE
P .25,7: BEEP .125,5: BEEP .08,3
: BEEP .08,2: BEEP .08,0: BEEP .
375,-2
  10 PRINT AT 12,2;"DO YOU WANT
INSTRUCTIONS? Y/N"
  11 IF INKEY$="y" THEN  GO TO 8
000
  12 IF INKEY$<>"n" THEN  GO TO
11
  13 LET z$="(55*sp)"
  14 LET y=2000
  15 LET q=0
  19 CLS
  20 BORDER 5: PAPER 2: INK 0: C
LS
  30 PRINT  PAPER 7;AT 2,7;"DIVI
NG SUPPLIES LTD";AT 4,4;"AQUA-LU
NG";AT 4,26;"300";AT 5,4;"FACE M
ASK";AT 5,27;"20";AT 6,4;"FLIPPE
RS";AT 6,27;"20";AT 7,4;"WET SUI
T";AT 7,26;"250";AT 8,4;"HIRE OF
 YACHT";AT 8,26;"300";AT 9,4;"SP
EAR GUN";AT 9,26;"180";AT 10,4;"
KNIFE";AT 10,27;"20";AT 11,4;"TO
RCH";AT 11,27;"20";AT 13,4;"KEY
QUANTITY REQUIRED";AT 14,4;"YOU
HAVE ";y;"DOLLARS"
  40 PRINT  PAPER 7; FLASH 1;AT
4,3;">"
  41 INPUT d
  42 IF d=0 THEN  PRINT  PAPER 7
;AT 15,3;"YOU CANNOT DIVE WITHOU
T AN   AQUA-LUNG TRY AGAIN": PAU
SE 400
  43 IF d=0 THEN  PRINT AT 15,3;
z$: GO TO 41
  44 IF d>4 THEN  PRINT  PAPER 7
;AT 15,3;"YOU CANNOT AFFORD MORE
 THAN 4 AQUA-LUNGS TRY AGAIN": P
AUSE 400
  45 IF d>4 THEN  PRINT AT 15,3;
z$: GO TO 41
  46 PRINT  INK 2;AT 4,3;"(sp)"
  47 LET y=y-(d*300)
  48 PRINT  PAPER 7;AT 14,4;"YOU
 HAVE ";y;"DOLLARS "
  50 PRINT  PAPER 7; FLASH 1;AT
5,3;">"
  51 INPUT e
  52 IF e=0 THEN  PRINT  PAPER 7
;AT 15,3;"YOU CANT DIVE WITHOUT
A FACE MASK TRY AGAIN": PAUSE 40
0
  53 IF e=0 THEN  PRINT  INK 2;A
T 15,3;z$: GO TO 51
  54 IF y-(e*20)<570 THEN  PRINT
  PAPER 7;AT 15,3;"YOU WILL BE U
NABLE TO AFFORD OTHER GEAR TRY A
GAIN": PAUSE 400
  55 IF y-(e*20)<570 THEN  PRINT
  INK 2;AT 15,3;z$: GO TO 51
  56 PRINT  INK 2;AT 5,3;"(sp)"
  57 LET y=y-(e*20)
  58 PRINT  PAPER 7;AT 14,4;"YOU
 HAVE ";y;"DOLLARS "
  60 PRINT  PAPER 7; FLASH 1;AT
6,3;">"
  61 INPUT f
  62 IF f=0 THEN  PRINT  PAPER 7
;AT 15,3;"YOU CANT DIVE WITHOUT
WEARING FLIPPERS TRY AGAIN": PAU
SE 400
  63 IF f=0 THEN  PRINT  INK 2;A
T 15,3;z$: GO TO 61
  64 IF y-(f*20)<550 THEN  PRINT
  PAPER 7;AT 15,3;"YOU WILL BE U
NABLE TO AFFORD OTHER GEAR TRY A
GAIN": PAUSE 400
  65 IF y-(f*20)<550 THEN  PRINT
  INK 2;AT 15,3;z$: GO TO 61
  66 PRINT  INK 2;AT 6,3;"(sp)"
  67 LET y=y-(f*20)
  68 PRINT  PAPER 7;AT 14,4;"YOU
 HAVE ";y;"DOLLARS "
  70 PRINT  PAPER 7; FLASH 1;AT
7,3;">"
  71 INPUT g
  72 IF g=0 THEN  PRINT  PAPER 7
;AT 15,3;"YOU CANT DIVE WITHOUT
A  WET SUIT TRY AGAIN": PAUSE 40
0
  73 IF g=0 THEN  PRINT  INK 2;A
T 15,3;z$: GO TO 71
  74 IF y-(g*250)<300 THEN  PRIN
T  PAPER 7;AT 15,3;"YOU WILL BE
UNABLE TO AFFORD YACHT HIRE TRY
AGAIN": PAUSE 400
  75 IF y-(g*250)<300 THEN  PRIN
T  INK 2;AT 15,3;z$: GO TO 71
  76 PRINT  INK 2;AT 7,3;"(sp)"
  77 LET y=y-(g*250)
  78 PRINT  PAPER 7;AT 14,4;"YOU
 HAVE ";y;"DOLLARS "
  80 PRINT  PAPER 7; FLASH 1;AT
8,3;">"
  81 INPUT h
  82 IF h=0 THEN  PRINT  PAPER 7
;AT 15,3;"YOU NEED A YACHT TO RE
ACH THE DIVING AREA TRY AGAIN":
PAUSE 400
  83 IF h=0 THEN  PRINT  INK 2;A
T 15,3;z$: GO TO 81
  84 IF h>1 THEN  PRINT  PAPER 7
;AT 15,3;"YOU'LL ONLY NEED 1 YAC
HT TRY AGAIN": PAUSE 400
  85 IF h>1 THEN  PRINT  INK 2;A
T 15,3;z$: GO TO 81
  86 PRINT  INK 2;AT 8,3;"(sp)"
  87 LET y=y-300
  88 PRINT  PAPER 7;AT 14,4;"YOU
 HAVE ";y;"DOLLARS  "
  90 PRINT  PAPER 7; FLASH 1;AT
9,3;">"
  91 INPUT i
  92 IF y-(i*180)<0 THEN  PRINT
 PAPER 7;AT 15,3;"YOU CANT AFFOR
D IT TRY AGAIN": PAUSE 400
  93 IF y-(i*180)<0 THEN  PRINT
 INK 2;AT 15,3;z$: GO TO 91
  94 PRINT  INK 2;AT 9,3;"(sp)"
  95 LET y=y-(i*180)
  96 PRINT  PAPER 7;AT 14,4;"YOU
 HAVE ";y;"DOLLARS  "
 100 PRINT  PAPER 7; INK 0; FLAS
H 1;AT 10,3;">"
 101 INPUT j
 102 IF y-(j*20)<0 THEN  PRINT
PAPER 7;AT 15,3;"YOU CANT AFFORD
 IT TRY AGAIN": PAUSE 400
 103 IF y-(j*20)<0 THEN  PRINT
INK 2;AT 15,3;z$: GO TO 101
 104 PRINT  INK 2;AT 10,3;"(sp)"
 105 LET y=y-(j*20)
```

```
 106 PRINT  PAPER 7;AT 14,4;"YOU
 HAVE ";y;"DOLLARS  "
 107 LET i1=i*6
 110 PRINT  PAPER 7; INK 0; FLAS
H 1;AT 11,3;">"
 111 INPUT k
 112 IF y-(k*20)<0 THEN  PRINT
PAPER 7;AT 15,3;"YOU CANT AFFORD
 IT TRY AGAIN": PAUSE 400
 113 IF y-(k*20)<0 THEN  PRINT
INK 2;AT 15,3;z$: GO TO 111
 114 PRINT  INK 2;AT 11,3;"(sp)"
 115 LET y=y-(k*20)
 116 PRINT  PAPER 7;AT 14,4;"YOU
 HAVE ";y;"DOLLARS  ": PAUSE 100
 117 CLS
 118 GO TO 950
 120 IF m$<>"n" AND m$<>"s" AND
m$<>"e" AND m$<>"w" THEN  GO TO
1175
 121 IF (l>1 AND m$="n") AND (l<
7 AND m$="n") THEN  PRINT  PAPER
 6; INK 0;AT 20,0;"YOU CANT GO T
HAT WAY TRY AGAIN  (S,E,W)": PRI
NT AT 21,7;z$( TO 23): PAUSE 200
: PRINT AT 20,0;z$;z$( TO 7): LE
T q=q+1: GO TO 1170
 122 IF l=1 AND m$="n" OR l=1 AN
D m$="w" THEN  PRINT  PAPER 6; I
NK 0;AT 20,0;"YOU CANT GO THAT W
AY TRY AGAIN  (S,E)": PRINT AT 2
1,6;z$( TO 24): PAUSE 200: PRINT
 AT 20,0;z$;z$( TO 7): LET q=q+1
: GO TO 1170
 123 IF l=7 AND m$="n" OR l=7 AN
D m$="e" THEN  PRINT  PAPER 6; I
NK 0;AT 20,0;"YOU CANT GO THAT W
AY TRY AGAIN  (S,W)": PRINT AT 2
1,6;z$( TO 24): PAUSE 200: PRINT
 AT 20,0;z$;z$( TO 7): LET q=q+1
: GO TO 1170
 124 IF l=8 AND m$="w" OR l=15 A
ND m$="w" OR l=22 AND m$="w" OR
l=29 AND m$="w" OR l=36 AND m$="
w" THEN  PRINT  PAPER 6; INK 0;A
T 20,0;"YOU CANT GO THAT WAY TRY
 AGAIN  (N,S,E)": PRINT AT 21,7;
z$( TO 23): PAUSE 200: PRINT AT
20,0;z$;z$( TO 7): LET q=q+1: GO
 TO 1170
 125 IF l=43 AND m$="s" OR l=43
AND m$="w" THEN  PRINT  PAPER 6;
 INK 0;AT 20,0;"YOU CANT GO THAT
 WAY TRY AGAIN  (N,E)": PRINT AT
 21,6;z$( TO 24): PAUSE 200: PRI
NT AT 20,0;z$;z$( TO 7): LET q=q
+1: GO TO 1170
 126 IF l=14 AND m$="e" OR l=21
AND m$="e" OR l=28 AND m$="e" OR
 l=35 AND m$="e" OR l=42 AND m$=
"e" THEN  PRINT  PAPER 6; INK 0;
AT 20,0;"YOU CANT GO THAT WAY TR
Y AGAIN  (N,S,W)": PRINT AT 21,7
;z$( TO 23): PAUSE 200: PRINT AT
 20,0;z$;z$( TO 7): LET q=q+1: G
O TO 1170
 127 IF l=49 AND m$="s" OR l=49
AND m$="e" THEN  PRINT  PAPER 6;
 INK 0;AT 20,0;"YOU CANT GO THAT
 WAY TRY AGAIN  (N,W)": PRINT AT
 21,6;z$( TO 24): PAUSE 200: PRI
NT AT 20,0;z$;z$( TO 7): LET q=q
+1: GO TO 1170
 128 IF l>43 AND l<49 AND m$="s"
 THEN  PRINT  PAPER 6; INK 0;AT
20,0;"YOU CANT GO THAT WAY TRY A
GAIN  (N,E,W)": PRINT AT 21,7;z$
( TO 23): PAUSE 200: PRINT AT 20
,0;z$;z$( TO 7): LET q=q+1: GO T
O 1170
 130 IF m$="n" THEN  LET l=l-7
 140 IF m$="s" THEN  LET l=l+7
 150 IF m$="e" THEN  LET l=l+1
 160 IF m$="w" THEN  LET l=l-1
 170 IF l=37 THEN  GO TO 300
 175 LET s$="A GIANT SQUIDA SHAR
KAN OCTOPUSA HUGE ELECTRIC EELA
MANTA RAY"
 180 LET o=INT (RND*10)+1
 181 CLS
 182 IF o<6 THEN  BORDER 2: PAPE
R 2: INK 7: CLS
 185 IF o=1 THEN  PRINT  FLASH 1
;AT 5,10;s$( TO 13): GO TO 500
 190 IF o=2 THEN  PRINT  FLASH 1
;AT 5,10;s$(14 TO 20): GO TO 500
 195 IF o=3 THEN  PRINT  FLASH 1
;AT 5,10;s$(21 TO 30): GO TO 500
 200 IF o=4 THEN  PRINT  FLASH 1
;AT 5,10;s$(31 TO 49): GO TO 500
 205 IF o=5 THEN  PRINT  FLASH 1
;AT 5,10;s$(50 TO ): GO TO 500
 206 IF o>5 THEN  BORDER 4: PAPE
R 4: CLS : PRINT AT 5,10;"NOTHIN
G HERE"
 210 GO TO 1151
 300 BORDER 7: PAPER 5: INK 0: C
LS
 310 PRINT  PAPER 6;AT 20,0;z$(
TO 32);AT 21,0;z$( TO 32)
 320 PRINT  PAPER 0;AT 14,3;z$(
TO 26);AT 15,4;z$( TO 24);AT 16,
4;z$( TO 23);AT 17,4;z$( TO 22)
 330 PRINT  PAPER 2;AT 18,4;z$(
TO 21)
 340 PRINT  PAPER 2;AT 19,5;z$(
TO 19)
 345 PRINT  INK 0;AT 14,29;"F";A
T 15,28;"F";AT 16,27;"F";AT 17,2
6;"F"
 346 PRINT  INK 2;AT 18,25;"F";A
T 19,24;"F"
 350 FOR a=4 TO 26 STEP 2
 360 PRINT  PAPER 0; INK 7;AT 14
,a;"O": NEXT a
 370 PRINT  INK 7;AT 13,3;"EEEE"
;AT 13,25;"EEEEE"
 380 PRINT  PAPER 7;AT 11,8;z$(
TO 10);AT 12,7;z$( TO 18);AT 13,
7;z$( TO 18)
 385 PRINT  PAPER 7;AT 11,8;"...
.......";AT 12,7;".............
...."
 390 PRINT AT 9,9;"(2*ig8)";AT 9
,13;"(2*ig8)";AT 10,9;"(2*ig8)";
AT 10,13;"(2*ig8)"
 400 PRINT  PAPER 7;AT 8,9;"(2*s
p)";AT 8,13;"(2*sp)"
 405 PRINT  PAPER 6; INK 0;AT 20
,8;"THE TREASURE SHIP";AT 21,8;"
PRESS""e"" TO ENTER"
 410 IF INKEY$<>"e" THEN  GO TO
410
 415 GO TO 3000
 500 PRINT ;AT 8,10;"WILL YOU (R
)UN";AT 10,19;"(F)IGHT";AT 12,19
;"(H)IDE"
 505 INPUT a$
 510 IF a$<>"r" AND a$<>"f" AND
a$<>"h" THEN  GO TO 505
 511 CLS
 512 IF a$="f" THEN  GO TO 530
 513 IF a$="h" THEN  GO TO 600
 515 IF a$="r" THEN  LET m=INT (
RND*6)+1
 520 IF m=4 OR m=5 OR m=6 THEN
GO TO 590
 525 PRINT AT 7,3;"NO CHANCE,THE
 BEAST HAS YOU  CORNERED,NOW YOU
 MUST FIGHT": PAUSE 150: CLS
 530 IF i>0 THEN  PRINT AT 8,2;"
YOU FIRE YOUR SPEAR GUN": PAUSE
150: GO TO 533
 532 IF i=0 THEN  GO TO 550
 533 IF i1=0 THEN  PRINT AT 9,2;
"NOTHING HAPPENS,YOU ARE OUT OF
AMMO": PAUSE 150: GO TO 549
 535 LET m=INT (RND*6)+1
 536 LET i1=i1-1
 540 IF m<5 THEN  PRINT AT 9,2;"
GOOD SHOT THE BEAST IS DEAD": PA
USE 100: GO TO 1151
 545 IF m>4 THEN  PRINT AT 9,2;"
YOU MISSED,NO TIME TO RELOAD": P
AUSE 150
 549 CLS
 550 IF j>0 THEN  PRINT AT 10,2;
"YOU DRAW YOUR KNIFE": PAUSE 150
 555 IF j=0 THEN  PRINT AT 10,2;
"YOU TRY IN VAIN TO FIGHT BARE H
ANDED": PAUSE 150: GO TO 585
 559 CLS
 560 LET m=INT (RND*6)+1
 565 IF m>4 THEN  PRINT AT 11,2;
"YOU LUNGE KILLING THE BEAST": P
AUSE 100: GO TO 1151
 570 PRINT AT 11,2;"YOUR LUNGE M
ISSES";AT 12,2;"THE BEAST ATTACK
S....": PAUSE 150
 575 LET m=INT (RND*6)+1
 580 IF m>4 THEN  PRINT AT 13,2;
"YOU EVADE THE ATTACK": PAUSE 15
0: GO TO 559
 585 PRINT AT 13,2;"THE BEAST ST
RIKES.YOUR LIFE   FLASHES BY IN
FRONT OF YOU.YOU    ARE DEAD.": P
AUSE 200: GO TO 700
 590 PRINT AT 13,2;"THE BEAST GO
ES IN SEARCH OF    EASIER GAME":
 PAUSE 100: GO TO 1151
 600 LET m=INT (RND*6)+1
 605 IF m<5 THEN  GO TO 525
 610 PRINT AT 10,2;"YOU HIDE BEH
IND SOME ROCKS ON  THE SEA BED";
AT 12,2;"THE BEAST PASSES BY": P
AUSE 100: GO TO 1151
 700 BORDER 0: PAPER 0: INK 7: C
LS
 710 PRINT AT 8,2;"DO YOU WANT A
NOTHER GAME Y/N?"
 715 INPUT b$
 720 IF b$="y" THEN  GO TO 1
 725 IF b$="n" THEN  PRINT AT 17
,13;"GOODBYE": PAUSE 200: NEW
 950 BORDER 0: PAPER 0: INK 7: C
LS
 960 PRINT AT 5,3;"YOU NOW HAVE
ALL THE ITEMS    NECESSARY TO CON
TINUE. YOU ALSO HAVE ";y;" DOLLA
RS LEFT."
 965 PRINT AT 8,3;"YOU ARE TAKEN
 IN YOUR HIRED    YACHT INTO THE
CENTRE OF THE    DIVING AREA. YOU
 DON YOUR DIVINGGEAR AND PREPARE
 TO ENTER THE    WATER."
 970 PRINT AT 21,3;"PRESS D TO E
NTER THE WATER"
 980 IF INKEY$<>"d" THEN  GO TO
980
 999 CLS
1000 BORDER 7: PAPER 5: INK 0: C
LS
1010 LET l=25
1020 LET a$="(32*sp)": PRINT  PA
PER 6;AT 20,0;a$;AT 21,0;a$
1040 FOR x=0 TO 18
1060 PRINT AT x,15;"A";AT x+1,15
;"B"
1080 BEEP .5,4
1100 PRINT AT x,15;"(sp)";AT x+1
```



continued on page 80

```
,15;"(sp)"
1120 NEXT x
1140 PRINT AT 19,15;"CD"
1150 PRINT  PAPER 6; INK 0;AT 20
,3;"NOTHING HERE"
1151 IF l=1 THEN  PRINT  PAPER 6
; INK 0;AT 21,3;"WHICH DIRECTION
S/E?": GO TO 1170
1152 IF l>1 AND l<7 THEN  PRINT
 PAPER 6; INK 0;AT 21,3;"WHICH D
IRECTION S/E/W?": GO TO 1170
1153 IF l=7 THEN  PRINT  PAPER 6
; INK 0;AT 21,3;"WHICH DIRECTION
 S/W?": GO TO 1170
1154 IF l=8 OR l=15 OR l=22 OR l
=29 OR l=36 THEN  PRINT  PAPER 6
; INK 0;AT 21,3;"WHICH DIRECTION
 N/S/E?": GO TO 1170
1155 IF l=14 OR l=21 OR l=28 OR
l=35 OR l=42 THEN  PRINT  PAPER
6; INK 0;AT 21,3;"WHICH DIRECTIO
N N/S/W?": GO TO 1170
1156 IF l>43 AND l<49 THEN  PRIN
T  PAPER 6; INK 0;AT 21,3;"WHICH
 DIRECTION N/E/W?": GO TO 1170
1157 IF l=43 THEN  PRINT  PAPER
6; INK 0;AT 21,3;"WHICH DIRECTIO
N N/E?": GO TO 1170
1158 IF l=49 THEN  PRINT  PAPER
6; INK 0;AT 21,3;"WHICH DIRECTIO
N N/W?": GO TO 1170
1160 PRINT  PAPER 6; INK 0;AT 21
,3;"WHICH DIRECTION N/S/E/W?"
1170 IF q=2 THEN  GO TO 2000
1175 INPUT m$
1180 GO TO 120
2000 CLS
2005 BORDER 5: PAPER 5: INK 0: C
LS
2010 PRINT AT 4,3;"A GOVERNMENT
PATROL VESSEL   HAS PICKED YOU U
P ON ITS SONAR, TRYING TO EXPLOR
E OUTSIDE YOUR  DESIGNATED AREA.
 THEY DESPATCH  TWO DIVERS TO AR
REST YOU AND    BRING YOU UP FOR
 QUESTIONING.": PAUSE 400
2015 PRINT AT 10,3;"THEY LET YOU
 OFF WITH JUST A CAUTION. HOWEVE
R THEIR ROUGH WAYOF HANDLING YOU
 HAS DAMAGED YOURAQUA-LUNG BEYON
D REPAIR.": PAUSE 400
2020 LET d=d-1
2025 IF d>0 THEN  PRINT AT 14,3;
"YOU RETURN TO YOUR SHIP AND  ST
RAP ON A SPARE. TO DIVE IN ANDRE
SUME YOUR SEARCH PRESS ANY KEY":
 PAUSE 0: LET q=0: GO TO 999
2030 PRINT AT 14,3;"YOU RETURN T
O YOUR SHIP AND  SEND FOR A SPAR
E. THE PRICE IS  500 DOLLARS WIT
H DELIVERY."
2034 PAUSE 400: CLS
2035 IF y-500<0 THEN  PRINT AT 6
,3;"YOU CANT AFFORD IT. YOU MIGH
TAS WELL GO HOME.";AT 15,3;"BETT
ER LUCK NEXT TIME": PAUSE 400: G
O TO 700
2040 PRINT AT 6,3;"AN AQUA-LUNG
ARRIVES AND YOU STRAP IT ON.  TO
 DIVE IN AND     RESUME YOUR SEAR
CH PRESS ANY KEY": PAUSE 0: LET
q=0: LET y=y-500: GO TO 999
3000 CLS
3005 BORDER 5: PAPER 5: INK 0: C
LS
3006 LET p=0
3010 PRINT AT 1,3;"YOU ENTER THE
 SHIP THROUGH AN OPEN PORTHOLE A
MIDSHIPS ON THE  STARBOARD SIDE.
"
3015 IF k=0 THEN  GO TO 3050
3020 PRINT AT 4,3;"YOU ARE IN A
LARGE STATEROOM.IT IS EMPTY SAVE
 FOR SOME BROKENFURNITURE.YOU CL
EAR THE WRECKAGEFROM THE DOOR AN
D GO THROUGH TO A LONG CORRIDOR
WHICH STRETCHES THE FULL LENGTH
OF THE SHIP. TO YOUR FAR LEFT IS
 A STAIRWAY UP. TO YOUR FAR RIGH
T IS ONE GOING  DOWN. ON BOTH SI
DES OF YOU ARE  THE DOORS TO STA
```



```
TEROOMS.";AT 21,3;"PRESS ANY KEY
 TO CONTINUE"
3025 PAUSE 0: CLS : GO TO 3200
3050 PRINT AT 4,3;"YOU ARE IN A
DARK ROOM. YOU  TRY TO FEEL YOUR
 WAY FORWARD BUTTHE ROOM IS FULL
 OF WRECKAGE ANDUNFORTUNATELY YO
U NEGLECTED TO  BUY YOURSELF A T
ORCH. OBVIOUSLY IT IS USELESS TO
 GO ON.";AT 10,3;"YOU RETURN TO
YOUR SHIP AND   RADIO ASHORE FOR
A TORCH TO BE  SENT TO YOU.";AT
21,3;"PRESS ANY KEY TO CONTINUE"
3060 PAUSE 0: CLS
3070 PRINT AT 6,3;"A TORCH ARRIV
ES. FOR SPECIAL DELIVERY THE PRI
CE IS DOUBLE."
3075 IF y<40 THEN  GO TO 3085
3080 PRINT AT 8,3;"YOU TAKE THE
NEW TORCH AND   DIVE BACK IN THE
 WATER.": LET y=y-40: LET k=k+1:
 PAUSE 400: GO TO 999
3085 PRINT AT 8,3;"YOU CANT AFFO
RD IT. YOU MIGHTAS WELL GO HOME.
";AT 15,3;"BETTER LUCK NEXT TIME
.": PAUSE 400: CLS : GO TO 700
3200 BORDER 7: PAPER 7: CLS
3205 FOR a=0 TO 255
3210 PLOT a,175: PLOT a,120: PLO
T a,104: PLOT a,48: NEXT a
3215 FOR b=120 TO 175
3220 PLOT 0,b: PLOT 63,b: PLOT 1
27,b: PLOT 191,b: PLOT 255,b: NE
XT b
3225 FOR b=48 TO 104
3230 PLOT 0,b: PLOT 63,b: PLOT 1
27,b: PLOT 191,b: PLOT 255,b: NE
XT b
3235 FOR a=104 TO 120: FOR b=0 T
O 16 STEP 2
3240 PLOT b,a: NEXT b: NEXT a
3245 FOR a=104 TO 120: FOR b=240
 TO 255 STEP 2
3250 PLOT b,a: NEXT b: NEXT a
3260 PRINT AT 1,1;"S/ROOM";AT 1,
9;"S/ROOM";AT 1,17;"S/ROOM";AT 1
,25;"S/ROOM"
3265 PRINT AT 3,3;"1";AT 3,11;"3
";AT 3,19;"5";AT 3,27;"7"
3270 PRINT AT 10,1;"S/ROOM";AT 1
0,9;"S/ROOM";AT 10,17;"S/ROOM";A
T 10,25;"S/ROOM"
3275 PRINT AT 12,3;"2";AT 12,11;
"4";AT 12,19;"6";AT 12,27;"8"
3280 FOR a=4 TO 28 STEP 8: PRINT
 AT 6,a;" ";AT 8,a;" ": NEXT a
3285 PRINT AT 17,3;"YOU ARE STAN
DING IN THE LONG CORRIDOR JUST O
UTSIDE STATEROOM6";AT 20,0;"TO E
NTER A STATEROOM KEY ITS No.TO G
O UP KEY""U""TO GO DOWN KEY""d""
"
3290 INPUT b$
3295 IF b$<>"u" AND b$<>"d" AND
b$<>"1" AND b$<>"2" AND b$<>"3"
AND b$<>"4" AND b$<>"5" AND b$<>
"6" AND b$<>"7" AND b$<>"8" THEN
 GO TO 3290
3300 IF b$="d" THEN  GO TO 5000
3310 IF b$="u" THEN  PRINT AT 17
,3;"YOU TRY THE STAIRWAY TO YOUR
 LEFT BUT FIND IT BLOCKED. YOU
 DECIDE TO STAY BELOW AND SEARCH
.": GO TO 3290
3315 IF b$="6" THEN  PRINT AT 17
,3;"YOU HAVE JUST COME OUT OF
  THERE. TRY SOMEWHERE ELSE.
 ";z$( TO 32): GO TO 3290
3320 IF b$="1" OR b$="2" OR b$="
4" OR b$="5" OR b$="7" OR b$="8"
 THEN  PRINT AT 17,3;"(6*sp)AN E
MPTY ROOM(10*sp)";z$;z$( TO 9):
GO TO 3290
3324 IF p=1 THEN  GO TO 3350
3325 IF b$="3" THEN  PRINT AT 17
,3;"AMID THE BROKEN GLASS AND
 SMASHED FURNITURE YOU FIND A
 WOMANS HANDBAG. INSIDE IT THER
E  IS A STOUT LOOKING KEY.
 ";z$( TO 32): PAUSE 400: PRINT
AT 17,3;"IF YOU WISH TO TAKE THE
```

```
 KEY  YOU MUST LEAVE YOUR SPEARG
UN IF YOU HAVE ONE. PRESS""Y""TO
 DO THIS OR""N""IF YOU DONT WANT
 THE KEY"
3335 INPUT c$: IF c$<>"y" AND c$
<>"n" THEN  GO TO 3335
3336 PRINT AT 17,3;z$;z$( TO 38)
;"TO ENTER A STATEROOM KEY ITS N
o.TO GO UP KEY""u""TO GO DOWN KE
Y""d"""
3340 IF c$="n" THEN  GO TO 3290
3345 LET i=0: LET p=1: GO TO 329
0
3350 PRINT AT 17,3;"(6*sp)AN EMP
TY ROOM(10*sp)";z$;z$( TO 9);"TO
 ENTER A STATEROOM KEY ITS No.TO
 GO UP KEY""u""TO GO DOWN KEY""d
""": GO TO 3290
5000 CLS
5010 PRINT AT 4,3;"YOU ARE NOW I
N THE BOWELS OF THE SHIP. YOU AR
E STANDING AT    THE BOTTOM OF TH
E STAIRWAY IN    HOLD B. ALL AROU
ND YOU IS BROKENWOOD FROM PACKIN
G CASES. RUSTINGCARS LIE TETHERE
D TO THE FLOOR.    A QUICK CHECK
 AROUND SHOWS   LITTLE OF ANY VA
LUE. IN FRONT OFYOU IS AN OPEN D
OORWAY LEADING  TO ANOTHER HOLD"
;AT 21,3;"PRESS ANY KEY TO CONTI
NUE"
5012 IF INKEY$="" THEN  GO TO 50
12
5015 GO TO 6000
5020 CLS
5040 BORDER 5: PAPER 5: INK 0: C
LS
5060 PRINT AT 5,3;"YOU ARE NOW I
N HOLD A, THE    DARKEST PLACE IN
 THE SHIP. YOU  FLASH YOUR TORCH
 ALL AROUND YOU.ALL YOU SEE IS W
RECKAGE. THEN,ASYOU ARE ABOUT TO
 GIVE UP YOU SEEA SIGHT WHICH CA
USES YOUR HEART TO SKIP A BEAT."
;AT 21,4;"PRESS ANY KEY TO SEE I
T"
5080 PAUSE 0
5500 CLS
5510 BORDER 0: PAPER 0: CLS
5520 FOR a=6 TO 16
5530 PRINT  PAPER 3;AT a,8;z$( T
O 16)
5535 NEXT a
5540 PRINT  PAPER 6; INK 0;AT 6,
8;"o";AT 6,23;"o";AT 7,8;"oooooo
ooooooooo";AT 8,8;"oooooooooooo
oooo"
5550 FOR a=9 TO 15: PRINT  PAPER
 6; INK 0;AT a,8;"o";AT a,23;"o"
: NEXT a
5560 PRINT  PAPER 6; INK 0;AT 16
,8;"oooooooooooooooo"
5561 PRINT  PAPER 3; INK 0;AT 10
,15;"G"
5565 FOR a=63 TO 191: PLOT  INK
0;a,111: NEXT a
5570 PRINT  INK 7;AT 18,8;"A TRE
ASURE CHEST";AT 21,4;"PRESS ANY
KEY TO OPEN IT": PAUSE 0
5580 IF p=0 THEN  PRINT  INK 7;A
T 17,10;"IT IS LOCKED";AT 18,8;z
$( TO 16);AT 19,3;"YOU MUST SEAR
CH FOR THE KEY";AT 21,0;"PRESS""
U""TO SEARCH THE STATEROOMS": PA
USE 0: GO TO 3200
5590 PRINT  INK 7;AT 18,2;"YOU P
UT YOUR KEY IN THE LOCK";AT 20,7
;"YOU TURN IT AND...";AT 21,0;z$
( TO 32): PAUSE 50
5595 FOR a=6 TO 5 STEP -1
5600 PRINT  PAPER 6; INK 0;AT a,
8;"oooooooooooooooo";AT a+1,8;"o
";AT a+1,23;"o"
5610 PRINT  PAPER 2; INK 7; FLAS
H 1;AT a+1,9;"HHHHHHHHHHHHHH": N
EXT a
5900 PAUSE 400
5901 BORDER 5: PAPER 7: CLS
5905 FOR x=0 TO 703
5910 LET a=INT (RND*8)
5915 PRINT  PAPER a;"(sp)";: NEX
T x
5920 PRINT  FLASH 1;AT 6,9;"CONG
RATULATIONS";AT 15,1;"DO YOU WAN
T ANOTHER GAME? Y/N": GO TO 715
6000 CLS
6010 FOR a=0 TO 255
6015 PLOT a,48: PLOT a,175: NEXT
 a
6020 FOR a=48 TO 175
6026 PLOT 0,a: PLOT 128,a: PLOT
255,a: NEXT a
6030 PRINT AT 7,5;"HOLD A";AT 7,
21;"HOLD B";AT 1,16;" ";AT 2,16;
" "
6035 FOR a=104 TO 120: FOR b=240
 TO 255 STEP 2
6040 PLOT b,a: NEXT b: NEXT a
6050 PRINT AT 20,3;"TO EXAMINE H
OLD A ENTER""A""";AT 21,5;"TO GO
 BACK UP ENTER""U"""
6060 INPUT b$
6070 IF b$="u" THEN  GO TO 3200
6080 IF b$="a" THEN  GO TO 5020
6090 GO TO 6060
7999 STOP
8000 CLS
8010 BORDER 0: PAPER 0: INK 7: C
LS
8020 PRINT TAB 2;"WELCOME TO DIV
ER.A SHIP HAS    SUNK SOMEWHERE O
FF THE COAST OF A SMALL SOUTH AM
ERICAN REPUBLIC.THE SHIP IS KNOW
N TO HAVE BEEN  CARRYING VAST TR
EASURE.YOUR TASKIS TO DIVE AND F
IND THE TREASUREYOUR RESEARCHES
 INDICATE THE    MOST LIKELY AREA
 TO SEARCH AND  PERMISSION HAS B
EEN GIVEN TO YOUTO SEARCH THAT A
REA,BUT FOR      REASONS OF NATIO
NAL SECURITY YOUMUST NOT STRAY O
UT OF THAT AREA.    FIRST YOU MUS
T BUY DIVING     GEAR.YOU HAVE AT
 YOUR DISPOSAL  2000 DOLLARS LOC
AL CURRENCY.          YOU WILL THEN
 BE TRANSPORTED TO THE CENTRE OF
 YOUR SEARCH     AREA.DURING THE
COURSE OF THE    GAME VARIOUS HAZ
ARDS WILL TEST  YOUR RESOURCE."
8030 PRINT AT 21,4;"PRESS ANY KE
Y TO CONTINUE"
8040 IF INKEY$="" THEN  GO TO 80
40
8050 CLS
8060 PRINT AT 3,0;"   ON-SCREEN
PROMPTS WILL HELP  YOU MAKE THE
CORRECT INPUT.IT ISSTRONGLY SUGG
ESTED THAT YOU DRAWA MAP TO AVOI
D SEARCHING THE     SAME AREA AGA
IN AND AGAIN.         GOOD LUCK"
8070 PRINT AT 21,4;"PRESS ANY KE
Y TO CONTINUE"
8080 IF INKEY$="" THEN  GO TO 80
80
8090 CLS
8100 GO TO 13
8500 BORDER 1: PAPER 1: INK 7: C
LS
8510 PRINT AT 7,14;"id;ii;iv;ie;
ir"
8520 PRINT AT 10,0;"iP;il;ie;ia;
is;ie;ig8;iw;ia;ii;it;ig8;iw;ih;
ii;il;ie;ig8;ig;ir;ia;ip;ih;ii;i
c;is;ig8;il;io;ia;id"
9000 LET a=BIN 00101000: LET b=B
IN 00111000: LET c=BIN 01000100
9010 FOR x=1 TO 8: READ p$
9020 FOR n=0 TO 7
9030 READ a: POKE USR p$+n,a
9040 NEXT n
9050 NEXT x
9060 DATA "a",BIN 0101100,a,a,a
,a,b,b,b
9070 DATA "b",b,BIN 01111100,BIN
 01010100,c,c,c,0,0
9080 DATA "c",0,0,0,BIN 01111111
,BIN 01000000,0,0,0
9090 DATA "d",0,BIN 01110000,BIN
 11111000,BIN 11110000,BIN 00011
111,0,0,0
9100 DATA "e",0,0,0,BIN 11111111
,BIN 10000001,BIN 11111111,BIN 1
0000001,BIN 11111111
9110 DATA "f",BIN 11111111,BIN 1
1111110,BIN 11111100,BIN 1111100
0,BIN 11110000,BIN 11100000,BIN
11000000,BIN 10000000
9120 DATA "g",0,BIN 00001110,BIN
 00001110,BIN 00000100,BIN 00000
100,BIN 00001110,BIN 00011111,BI
N 00011111
9130 DATA "h",BIN 00011101,BIN 1
0001000,BIN 01000111,BIN 1110101
0,BIN 00010001,BIN 11101010,BIN
01011100,BIN 10101010
9200 GO TO 1
```

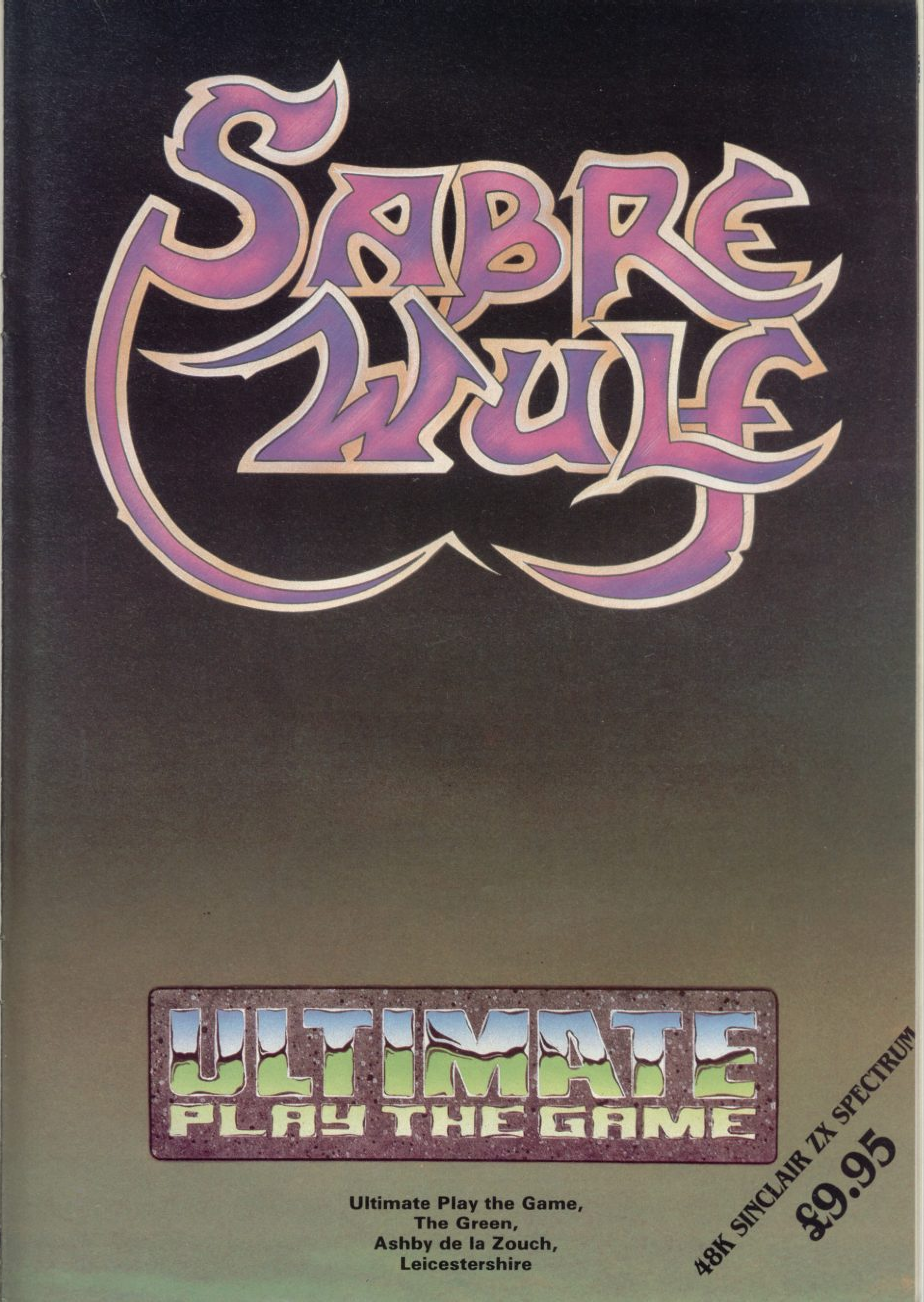




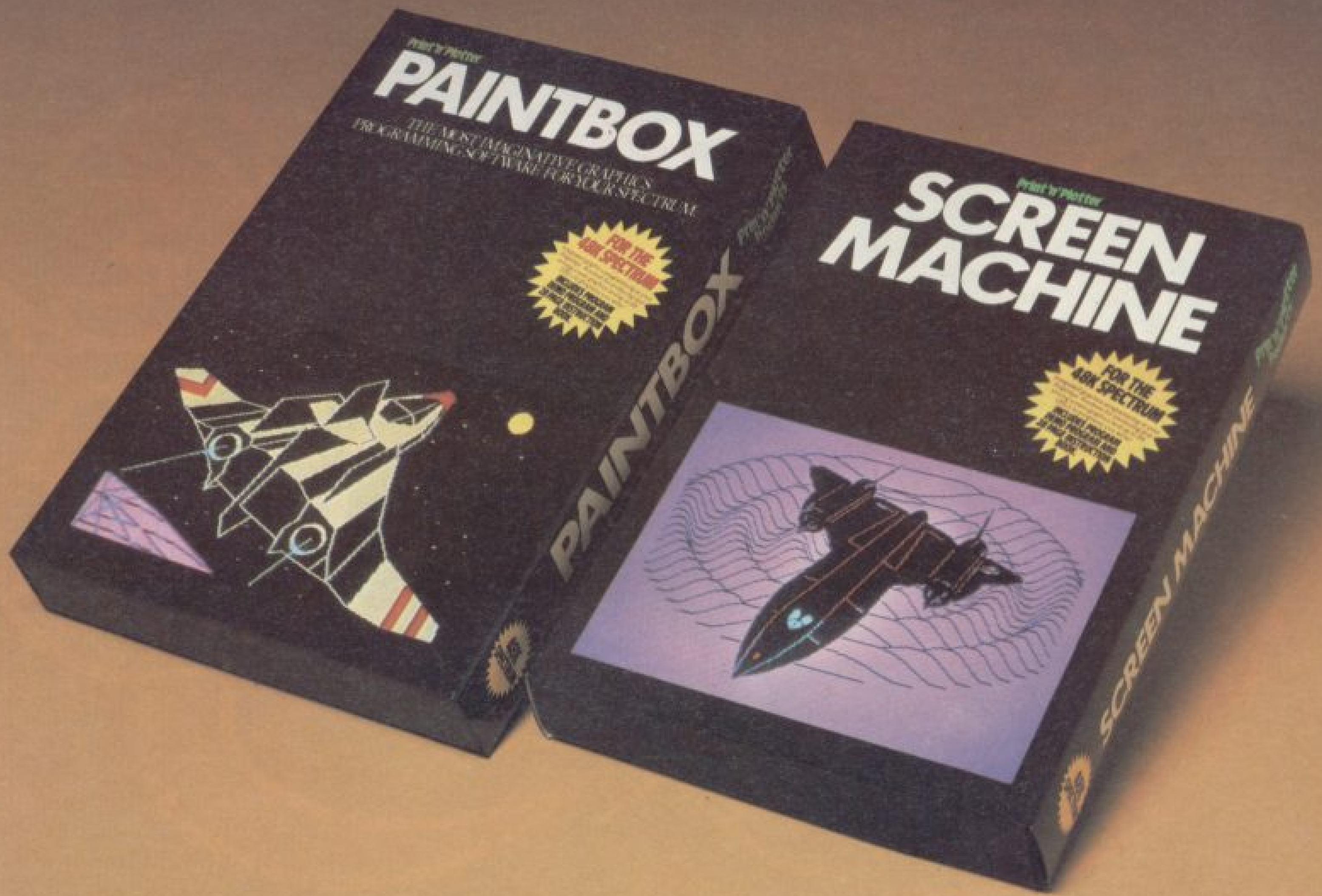
THE HERMIT CRAB lives a solitary life in this game by J Neil of Shotgate, Essex. Emerging from its little cave, it must eat as much food as possible while avoiding the jellyfish and crab-eating seaweed. At the end of the game a giant goldfish appears and the crab must scuttle back home as fast as it can.

The game, for the 16K Spectrum, uses special graphics characters, so please read the instructions on page 67 before you key-in the program.

```
  10 BORDER 1: PAPER 1: FLASH 0:
 BRIGHT 1: INK 7: OVER 0: INVERS
E 0: RESTORE : CLEAR : CLS
  15 LET aa=0: LET Z=1: LET A=21
: LET B=0: LET SC=0: LET HSC=0:
LET TIME=250: DIM A$(2): LET A$(
1)="A": LET A$(2)="B"
  20 GO SUB 1000
  30 GO SUB 2000: CLS
  40 FOR V=1 TO 100: PRINT AT IN
T (RND*22),INT (RND*32);".": NEX
T V
  50 FOR V=1 TO 12: PRINT AT INT
 (RND*22),INT (RND*32); INK 2;"C
": NEXT V
  60 FOR V=0 TO 8: PRINT AT INT
(RND*22),INT (RND*32); INK 4;"D"
: NEXT V
  70 FOR V=0 TO 8: PRINT AT INT
(RND*22),INT (RND*32); INK 6;"C"
: NEXT V
  74 PRINT AT 21,0; INK 6; BRIGH
T 0;"F"
  75 GO SUB 9000
  80 PRINT AT 21,0; INK 6; BRIGH
T 0;"F"
  81 IF a=21 AND b=0 THEN  BEEP
.02,z-25: GO TO 90
  85 PRINT AT A,B; INK 3;A$(Z):
BEEP .02,Z-25
  90 LET Z=Z+(Z=1)-(Z=2)
 100 IF A=21 AND B=0 THEN  GO TO
 120
 110 PRINT AT A,B;"(sp)"
 120 LET B=B+(INKEY$="p" AND B<3
1)-(INKEY$="o" AND B>0)
 130 LET A=A+(INKEY$="a" AND A<2
1)-(INKEY$="q" AND A>0)
 140 IF TIME=0 THEN  GO TO 5000
 150 LET TIME=TIME-1
 160 IF SCREEN$ (A,B)="." THEN
BEEP .05,10: LET SC=SC+1
 170 IF ATTR (A,B)=78 THEN  BEEP
 .05,-15: LET aa=1: GO TO 3000
 180 IF ATTR (A,B)=76 THEN  BEEP
 .05,-15: LET aa=1: GO TO 3000
 185 IF ATTR (A,B)=74 THEN  BEEP
 .05,15: LET SC=SC+10
 186 IF TIME<=25 THEN  BEEP .05,
30
 190 GO TO 80
1000 FOR N=0 TO 7: READ M: POKE
USR "a"+N,M: NEXT N: DATA BIN 00
100100,BIN 00100100,BIN 10011001
,BIN 11111111,BIN 00111100,BIN 0
1011010,BIN 10100101,BIN 0010010
0
1010 FOR N=0 TO 7: READ M: POKE
USR "B"+N,M: NEXT N: DATA BIN 0,
BIN 00011000,BIN 00111100,BIN 01
111110,BIN 01111110,BIN 00111100
,BIN 0,BIN 0
1020 FOR N=0 TO 7: READ M: POKE
USR "c"+N,M: NEXT N: DATA BIN 0,
BIN 0,BIN 0,BIN 00111000,BIN 001
11000,BIN 00111000,BIN 0,BIN 0
1030 FOR F=0 TO 7: READ M: POKE
USR "d"+F,M: NEXT F: DATA BIN 10
100101,BIN 10010101,BIN 01001001
,BIN 10001010,BIN 01010100,BIN 0
0101000,BIN 00011000,BIN 0001100
0
1040 FOR F=0 TO 7: READ M: POKE
USR "E"+F,M: NEXT F: DATA BIN 00
111000,BIN 01111100,BIN 11111110
,BIN 01010100,BIN 01010100,BIN 0
1010100,BIN 01010100,BIN 0100010
0
1050 FOR N=0 TO 7: READ M: POKE
USR "F"+N,M: NEXT N: DATA BIN 00
111100,BIN 01111110,BIN 11111111
,BIN 11111111,BIN 11111111,BIN 1
1100111,BIN 11000011,BIN 1100001
1
1060 RETURN
2000 PRINT AT 10,12;"HERMIT"
2010 PAUSE 0: BEEP .5,0
2020 CLS : PRINT AT 8,10; INK 3;
"A"; INK 7;"=YOU";AT 10,10;".=1
POINT";AT 12,10; INK 2;"C"; INK
7;"=10 POINTS"
2025 PRINT : PRINT TAB 10;"Q=UP"
: PRINT : PRINT TAB 10;"A=DOWN":
 PRINT : PRINT TAB 10;"P=RIGHT":
 PRINT : PRINT TAB 10;"O=LEFT"
2030 PAUSE 0: BEEP .5,0: CLS
2040 PRINT "YOU,THE LITTLE HERMI
T CRAB LIVE AT THE BOTTOM OF THE
 SEA.        YOU HAVE MANY ENEMIE
S INCLUDING GIANT JELLYFISH ~";
INK 6;"E"; INK 7;"~ AND CRAB
GRABBING SEAWEED  ~"; INK 4;"D";
 INK 7;"~ BUT YOUR  WORST ENEMY
IS A GIANT GOLDFISH.WHILE HE IS
AWAY HUNTING YOU AREABLE TO GATH
ER FOOD TO SURVIVE. COLLECT AS M
ANY PIECES OF FOOD  AS POSSIBLE
AND RETURN TO YOUR  HOLE IN THE
SAND BEFORE HE      RETURNS,FOR
A 20 POINT BONUS"
2050 PAUSE 0
2060 BEEP .5,0
2070 CLS : GO TO 40
3000 BEEP 1,-30: IF A=21 AND B=0
 THEN  LET SC=SC+20
3010 CLS : IF aa=1 THEN  PRINT A
T 8,12;"OUCH!"
3015 PRINT AT 10,10;"GAME OVER"
3020 PRINT AT 0,0;"SCORE ";SC
3025 IF sc>=hsc THEN  LET hsc=sc
3030 PRINT AT 0,18;"HIGH SCORE "
;HSC
3040 PAUSE 0: CLS : LET TIME=250
: LET SC=0: LET Z=1: LET A=21: L
ET B=0: LET aa=0: GO TO 40
5000 INK 2: FOR V=23 TO 0 STEP -
1
5002 IF A<>21 AND B<>0 THEN  PRI
NT AT a,b; INK 3;"A"
5005 BEEP .05,30
5010 PRINT AT 10,V;"(ig2,ig4,2*i
g8,ig1,sp,ig2)"
5020 PRINT AT 11,V;"(g3,6*ig8)"
5030 PRINT AT 12,V;"(g7,3*ig8,ig
4,sp,g7)"
5040 FOR M=0 TO 2: NEXT M
5050 PRINT AT 10,V;"(ig2,ig4,2*i
g8,ig1,sp,ig2)"
5060 PRINT AT 11,V;"(7*ig8)"
5070 PRINT AT 12,V;"(g7,3*ig8,ig
4,sp,g7)"
5080 FOR N=0 TO 2: NEXT N
5090 PRINT AT 10,V+6;"(sp)"
5100 PRINT AT 11,V+6;"(sp)"
5110 PRINT AT 12,V+6;"(sp)"
5120 NEXT V
5130 CLS
5150 INK 7: GO TO 3000
9000 FOR V=10 TO 0 STEP -1: BEEP
 .05,10+V: BEEP .05,9+V: BEEP .0
5,8+V: NEXT V
9010 RETURN
```


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The Hardware.



The Facts.

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PRINT 'N' PLOTTER

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It SUPERIMPOSES screen graphics giving incredible 'mixing' results!

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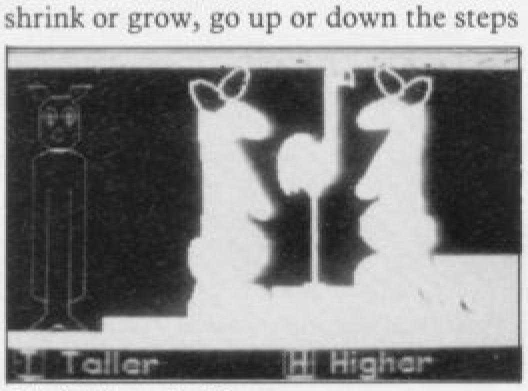
Rainy day software

Theodora Wood looks at a wide variety of educational games to keep you occupied during those endless summer holidays

SUMMER HOLIDAYS are the time of the great outdoors, when activities centred on the computer seem less attractive than in the winter months. Rainy days, however, can be rather daunting, so this month I examine some packages to amuse and interest as well as being of some educational value, for all ages between three and 80.

Mr T's Measuring Games from Ebury Software explores the concepts of size, taller/shorter, and higher/lower for children aged between three and six. Growing Races shows two objects on the screen; as the child watches, one increases in size and the object of the game is to press SPACE when their size is identical. Starting with two stationary objects, the game progresses to two moving objects, which makes it rather more difficult to assess the moment when the size is identical.

Climbing and Growing displays animals on steps which can be made to shrink or grow, go up or down the steps



Mr T's Measuring Games

until they fit the space exactly; the child has to press SPACE when they do that and, if correct, the animals are filled in with colour.

For both games a menu can be reached by pressing Q, where difficulty levels can be set between one and nine and sound and colour turned on or off; otherwise the difficulty increases according to the child's skill. The booklet with the package contains plenty of hints for other activities and how to use the program with children of that age group.

A useful feature is that CAPS SHIFT/BREAK does not crash the program, so little fingers can explore without fear of that. Measuring Games is attractive in its format and easy to use with very young children.

Look Sharp from Mirrorsoft is another fine example of Gordon Askew's skill with graphics on the Spectrum, as seen previously in **The Humpty Dumpty Mystery.** New packaging provides an A5-size semi-hard cover. Two programs are provided, Old Macdonald's Farm and SORT. Old Macdonald's Farm tests visual skills in three areas — memory, odd one out and snap. For section one, memory skills are tested by showing a picture of four animals placed in different positions on a square; pressing any key makes the animals disappear and then the child has to press a key when a picture appears which matches the animal portrayed previously in that position.

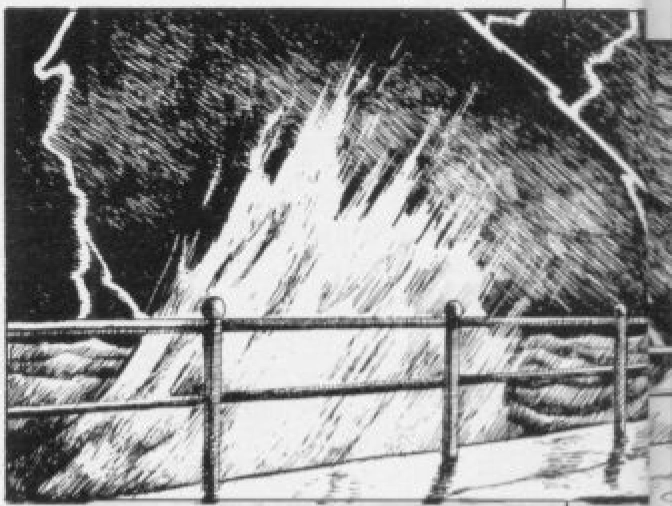
If an incorrect response is given, the whole picture is shown again. For odd one out, Macdonald moves along the top of three pictures; pressing any key will stop him above the picture which is the odd one out.

In Snap, two pictures are shown, each changing in turn as in a game of Snap; it can be played either as a one- or two-player game and a picture of Old Macdonald is built.

SORT presents a situation where a space cadet must pass observation tests, based on the visual skills found in Old Macdonald; the tests are visual perception, visual discrimination and visual memory. The main menu allows a choice of practice at any of those which can be easy or difficult, and the fourth choice is the full test. The visual perception test is a Snap game with a difference, for there are two rows of three pictures and the child has to press any key to indicate any match — of rockets, little spacemen and spaceships.

Correct responses allow the blue rocket score to lift off while the red rocket indicates incorrect responses. Visual discrimination asks the user to pick the odd one out of the six pictures shown; that can be difficult and careful selection is needed. The last section, visual memory, asks the child to remember the nine pictures in their correct positions and the picture is shown again with 'press any key when ready' if an incorrect response is made.

Quizzes can be an interesting way to pass an hour or two and there are two new programs, **Hotline** and **Startrucker,** which are both based on the quiz format. Hotline from Chalksoft is designed to appeal to ages eight to 80. One notable feature is the new approach to packaging shown by the glossy book-jacket-type cover and the accompanying booklet. Previously Chalksoft programs have been minimal in their packages,



with a cassette supplied with inner cover, and the new-style packaging must reflect the growing professionalism of some of the smaller software houses, taking their presentation into line with the major publishing houses like Longmans. That obviously increases shelf appeal on the stands of W H Smith and the major retailers.

The program is a quiz based on multiple choice of four questions. Once LOADed, there is a start menu which allows the user to play with the current set of questions or LOAD a new set of questions from the outer side of the tape; they are starred according to difficulty level, ranging from one-star (easy) to six-star (genius) covering much options as Cowboys, Pirates and Mastermind.

Option three leads to the special menu, where seven more choices can be made. The number of questions in each set for a Hotline quiz can be limited between five and 20; new questions can be added to the current set or a completely new set could be created.

The new sets can be SAVEd for future use. Options for LOADing a new set of questions or returning to the start menu are also available. The provision of those options ensures that Hotline is versatile and lends itself to

repeated usage. As such, the program does not depend for its range of difficulty levels on the questions provided, so that any child who is able to read would be able to use the program and any kind of question could be provided, although multiple-choice answers are not the best vehicles for odd-one-out type questions, which have to be unambiguous.

The motivation scenario, however, requires a little more thought; the aim of the game is to answer a number of questions correctly — five to 20 — and complete the link between the two red telephones at the top of the screen. The penalty for failing to accomplish that is a flashing explosion and a skull appear-



ing on the screen. The program notes explain the conceptual nature of the Hotline — "To maintain world peace, the Hotline telephone link between the world's leaders must be kept . . . but the line has broken and the world is on the brink of disaster . . . each correct answer repairs another section of the Hotline, until the White House and the Kremlin can speak together again."

To be effective as a motivation scenario, Hotline relies on fear of world disaster; a thousand other scenarios could have been chosen as a quiz background which might have been more desirable; also £11.25 is a high price to pay for quiz facilities which can be found in such programs as **Whizz Quiz** and **Jungle Jumble,** by Clever Clogs and Computertutor.

Aimed at the nine-plus age group **Startrucker,** from Clever Clogs, shows the same endearing qualities of a mixture of jokes and questions, on-screen happenings and keyboard use as of previous publications. The company has also smartened its packaging but the formula is roughly the same.

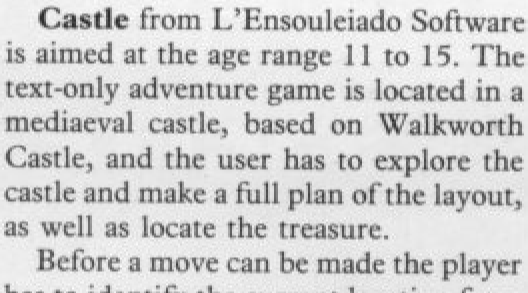
The motivation scenario for Startrucker is to arrive in a position with the spaceship Jupiter near Earth with no points left and 100 credits. If the force field has also been built-up a leap into hyperspace is executed with flashing lights and colours. Points to buy credits and build up the force field are awarded by correct answers. One hundred questions are provided and they can be changed; Clever Clogs is also soon to release tapes of questions on science, arts or general knowledge, with 600 questions per tape with full compatibility with any of its quiz programs.

Adventure programs can provide plenty of reading practice. **Zoo** from L'Ensouleiado Software, takes the form of an interactive storybook. As the title suggests, the subject matter involves a visit to a zoo; at each stage the child has to decide which animals to visit next. This zoo is different, however, as none of the animals is in a cage and hazards can include dozing snakes and hungry dolphins, as well as a donkey with a sweet tooth which refuses any food except chocolate.

Illustrated with line drawings, Zoo simulates a day at the zoo with decision-making at every turn, suitable for seven- and eight-year-olds, although not likely to retain interest over a period of weeks. It is an interesting formula, however, which could be developed for all kinds of scenarios.

Castle from L'Ensouleiado Software is aimed at the age range 11 to 15. The text-only adventure game is located in a mediaeval castle, based on Walkworth Castle, and the user has to explore the castle and make a full plan of the layout, as well as locate the treasure.

Before a move can be made the player has to identify the current location from the description given — a full list of terms and a grid map are provided — or answer a question about castles. If the



Old Macdonald's Farm

answer is incorrect things can happen, such as being marched back to the main door by men-at-arms.

Castle provides the user with a fascinating way of learning about mediaeval castles, as well as having the usual ingredients of an adventure game, with up to 84 locations. Good value for money, Castle could be the first of many history games in this format. A visit to a castle during the holidays could be a great deal more informed after using the program and it would be useful in school project work during term time.

L'Ensouleiado Software continues the history theme in **Cortes** for 13- to 15-year-olds, which enables the user to role-play the part of Cortes, the Spanish Conquistador. The player has to make decisions on the information given and will gain or lose points according to those decisions. Equipment checks and crisis reports keep the player alert as to the state of the army and horses and also provide reminders as to the importance of such activity in leading an expedition, as well as illustrating the impact of an alien incursion on native culture. Maps of the area are also shown. The author is a history teacher at a comprehensive school in Cumbria.

For those of a more scientific frame of mind, ETST Software has produced a package to teach the first stage of electronics. **Learner's Guide No 1** makes no concession to enjoyment as it is a straightforward learning package aimed at those who feel a desire to learn about the subject.

The subject matter covers material from the O level syllabus in control technology — the atom, the lattice, the P-N junction, functions of the P-N junction in the semiconductor diode, and Ohm's Law. A 24-page booklet in rather small print outlines the subject matter and each section ends with self-assessment questions. The explanations are clear enough and I found little difficulty in understanding the terminology. The computer program reflects the instruction given in the booklet, with the added advantage that the diagrams are animated, which is of great assistance in understanding such concepts as the behaviour of electrons in a doped silicon lattice and forward and reverse bias.

One criticism, however, is that the screens of information scroll without user control and, although a re-run can be made, it would have been useful to

continued on page 88

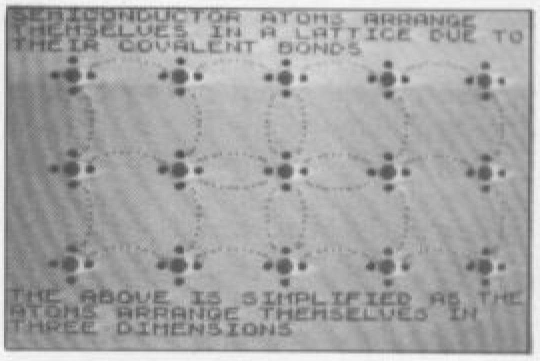
EDUCATION

continued from page 87

have the facility to 'Press any key when ready' as technical information requires some study. The program is recorded on one side of the tape only and it would have been better to have had the SAQs on the other side, rather than in the booklet.

The package has its practical side also, because with parts included it is possible to demonstrate the principles contained in the booklet and the program, forward and reverse bias, a continuity tester to test conductivity of household materials, an OR gate and an AND gate. It is the practical aspect of the work which really illustrates the working of the theory, as in a science lesson.

Learning to wire the components and identify them is of great assistance in attaining a thorough understanding of the working of the theories and can form the basis of further practical work. My local electrician priced the components supplied at £3, so a price of £5 for components supplied by ETST to build an electronic communicator between different rooms in a house or to call up to seven people does not seem unreasonable and, having followed the learning package, is entirely feasible, as the circuit diagram is very clear and



Learner's Guide No 1

straightforward, once the components have been identified.

It is not recommended for those who do not enjoy the idea of wires trailing round the house but would be an interesting project to follow when other pressures of study were less exigent. ETST is preparing another package to cover the transistor as the basis of **Learner's Guide No 2.**

Looking back at these packages, from the most professional-looking design boxes to the simple cassette case, it is apparent that, as with books, you cannot judge a program by its cover. It would seem also that part of the reason for higher prices is the packaging which, although attractive on a shelf, does not necessarily mean that it is better value in educational terms.

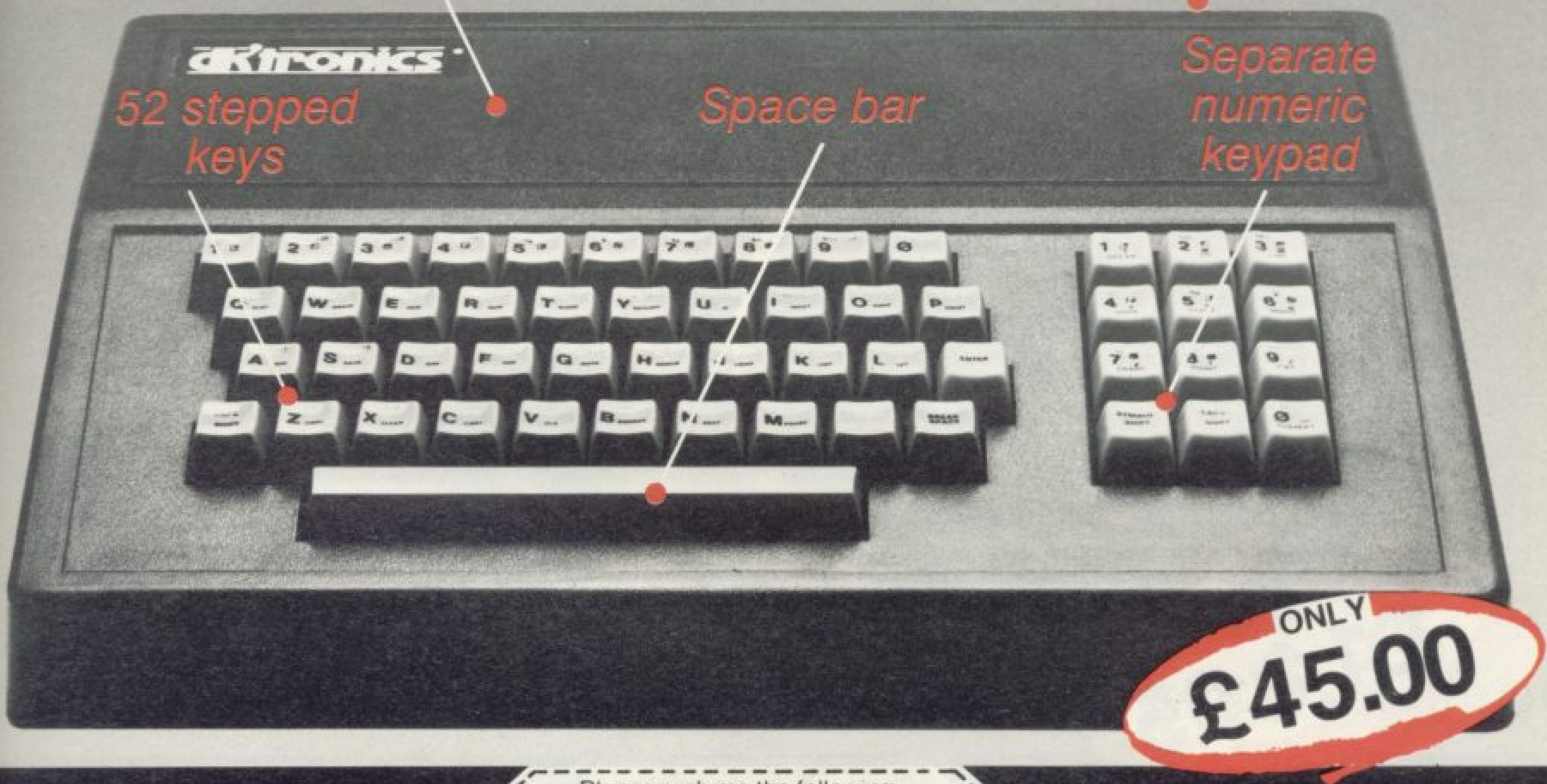
Title	Publisher	Memory	Price	Gilbert Factor
Mr T's Measuring Games	Ebury Software	48K	£9.95	7
Look Sharp	Mirrorsoft	48K	£7.95	7
Hotline	Chalksoft	48K	£11.25	5
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Castle	L'Ensouleiado	48K	£4.85	7
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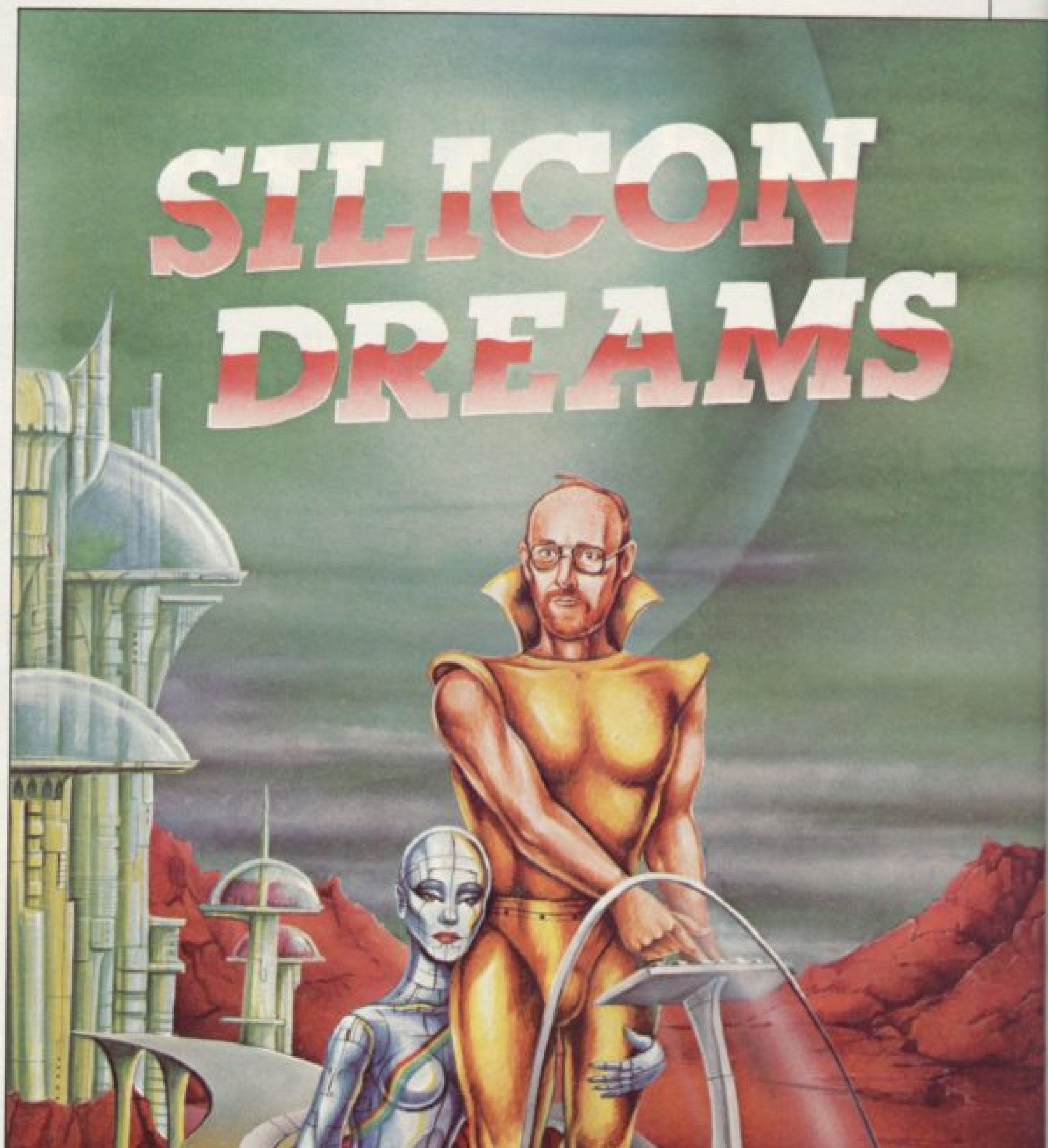
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The Spectrum Connection

Silicon-based life-forms will inhabit the cities of the future, Sir Clive Sinclair told the U.S. Congressional Clearinghouse on the Future. The speech, made earlier this year, is reprinted below.



"WE HAVE been told we are at the start of the second industrial revolution, a concept which seemed radical yesterday, commonplace today. I agree with the idea, though it might be more useful to consider the process we are experiencing as the third rather than the second revolution.

"By my counting, the first occurred when mankind learned to plant and harvest, so ending the nomadic age of the hunter gatherer, who perforce spent most of his time, at least during long parts of the year, in pursuit of food.

"The farmer, as we have come to think of these first revolutionaries, was able by his husbandry to feed himself and several others, freeing those from the need to feed themselves. They turned to making things — spades for the garden, buckets and bowls for the house, chariots and ships in which to explore the world. They began to write and record, to frame laws and protect large areas from their enemies.

"Many must have mourned the loss of a simpler, more innocent existence; indeed, the story of the garden of Eden may reflect this but the change broadened mankind, the population grew and spread. There was no chance of return.

"The second great change occurred around the end of the eighteenth century when we learned to make things not with hand-held tools but with machines. In truth, the change was a gradual one; garment-making machines, though hand-powered, pre-date the pyramids and many examples can be found in Roman times of large-scale industry. So perhaps the essential element in what we call the industrial revolution was the invention of steam power, which not only provided the engines for industry but also the power for transport. The energy in coal replaced the energy in wind.

"Again population leapt, again men travelled far more, again yet larger territories were defended, again men came to long for an arcadian past which existed more in fancy than in truth, but the simple items of our daily life, the furnishings of our dwellings, became immensely more abundant. Many more were freed by this profusion to lead more contemplative, studious lives in our universities to the eventual benefit of the advance of science.

"So we come to the third great change which is seen to be upon us, the second industrial revolution as it may be. Partly this is concerned with the replacement of people in factories by robots and computers. Partly, it is the leap made possible in the manipulation and transmission of information. Wholly it is down to the computer in one way or another and once again millions of people will be freed by the change to adopt other pursuits.

"From a positive viewpoint they are free from the drudgery of the mill. Negatively and realistically they are unemployed and very miserable. This is a sad consequence and we are not so well

able to manage our affairs as to prevent it but it is a temporary pattern, I believe, caused by the incredibly rapid loss of manufacturing employment. Where in the 1940s 50 percent of people worked in factories, not 10 percent will work only half a century later. This revolution will broaden horizons as much as the other two.

"This, then, is one way of looking at the way we live that is current and becoming popular. It is probably reasonable but if we focus on an analogy with the industrial revolution, we will miss a much more dramatic analogy. Instead of looking back centuries and millenia for a comparison with our times, I would draw you back a million times further into the past than the beginnings of civilisation.

"Four thousand million years ago, when the universe was only half the size it is now and the solar system only five million years old, a singular thing happened — life. By some ineluctable process in the primordial soup, stirred by fierce cosmic rays and bolts of lightning, carbon compounds of strange complexity formed and re-formed, growing in subtlety until they came to transmute sunlight and to replicate. For a billion years these first bacteria, so mysteriously conjured, clumping together to form living reefs called stromatolites, were the only life. Yet three billion years later they evolved into mankind.

"I said that the event that started this process was singular and so, for all we know, it was. So it will long remain. All life is carbon-based and carbon is exceptional in the variety of compounds to which it leads, providing organisms with a rich choice of building materials. If we ever discover life on other planets we would not be surprised to find it similarly based on carbon but it might not be so.

"When I was a boy I read science fiction stories and in those days a common theme was the discovery of a life form strangely different from ours. A popular idea was for life based not on carbon compounds but on silicon on the grounds, I believe, that silicon, too, can form a wealth of products, many of them physically useful. Soon, I suggest, those stories will seem strangely prescient, for silicon-based life will exist. It will not have emerged from millions of years of trial and error in energetic protoplasm but from a mere century or less of man's endeavour. I am suggesting that the path the silicon-based electronics industry is on will lead to life.

"The human brain contains, I am told, 10 thousand million cells and each of these may have a thousand connections. Such enormous numbers used to daunt us and cause us to dismiss the possibility of making a machine with human-like ability but now we have grown used to moving forward at such a pace we can be less sure. Soon, in only 10 or 20 years perhaps, we will be able to assemble a machine as complex as the human brain and if we can we will. It may then take us a long time to render it intelligent by loading in the proper software or by altering the architecture but that, too, will happen.

"I think it certain that in decades, not centuries, machines of silicon will arise first to rival and then surpass their human progenitors. Once they surpass us they will be capable of their own design. In a real sense they will be reproductive. Silicon will have ended carbon's long monopoly — and ours, too, I suppose, for we will no longer be able to deem ourselves the finest intelligence in the known universe. In principle it could be stopped; there will be those who try but it will happen nonetheless. The lid of Pandora's box is starting to open.

'We will no longer be able to deem ourselves the finest intelligence in the known universe'

"Let us look a little closer to the present. By the end of this decade manufacturing decline will be almost complete, with employment in manufacturing industries less than 10 percent in Britain. The goods are still needed but, as with agriculture already, imports and technical change will virtually remove all employment.

"Talk of information technology may be misleading. It is true that one of the features of the coming years is a dramatic fall, perhaps by a factor of 100, in the cost of publishing as video disc technology replaces paper and this may be as significant as the invention of the written word and Caxton's introduction of movable type.

"Talk of information technology confuses an issue — it is used to mean people handling information rather than handling machines and there is little that is fundamental in this. The real revolution which is just starting is one of intelligence. Electronics is replacing man's mind, just as steam replaced man's muscle but the replacement of the slight intelligence employed on the production line is only the start.

"The Japanese, with the ICOT program, are aiming to make computers dealing with concepts rather than numbers with thousands of times more power than current large machines. This has triggered a swift and powerful response in the American nation. There is a large joint programme of development among leading U.S. computer companies; it is at least as large as DARPA program and IBM, though it says nothing, may well have the biggest programme of all.

"These projects are aimed at what are loosely termed fifth-generation computers. These are really a new breed of machine entirely and will be as different from today's computers as today's computer is from an adding machine. Powerful as these new engines will be, they will not remain inordinately expensive, thanks to the progress of the semiconductor industry. Once available they will start to replace human intelligence at ever higher levels of abstraction.

"The simple microprocessor provides sufficient intelligence for current assembly line robots. As robots learn to see and feel, their brains will grow. Eventually, and not too far in the future, they will make decisions on the production line currently delegated to a supervisor.

"Outside the factory we employ men's minds in two principal ways, as fonts of knowledge and as makers of decisions. The former of these attributes is now falling prey to the machine with the development of 'expert systems' whereby the acquired knowledge of a man, an expert in mining for example, is made to repose in the memory of a computer. The transfer of data from human to machine mind is neither easy nor swift but, once attained, it may be copied at will and broadcast. A formerly scarce resource can thus become plentiful.

"The ability to reach wise conclusions, as we expect of a doctor or lawyer, from much or scant data will long remain man's monopoly but not always. Fifth-generation computers will share this prerogative. Tomorrow we may take our ailments to a machine as readily as to a man. In time that machine

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will be in the house, removing the need to journey to the doctor and providing a far more regular monitoring of the state of health than it is now economic to provide.

"The computer as surrogate teacher may bring even more benefits. Today, and as long as we depend on humans, we must have one teacher to many pupils. The advantage of a tutor for each child is clear and if that tutor is also endlessly patient and superhumanly well-informed we may expect a wonderful improvement in the standard of education.

"What, though, is the purpose if, in this imagined future, there are no jobs? Curiously we can find analogies in the past. Freemen of Periclean Athens led not such different lives as we might live, for where we will have the machines, they had slaves who served both to teach and as menials. Thanks, perhaps, to their fine education, the freemen of Athens seem not to have found difficulty in filling their time. Just as they did, we will need to educate our children to an appreciation of the finer things of life, to inculcate a love of art, music and science. So we may experience an age as golden as that of Greece.

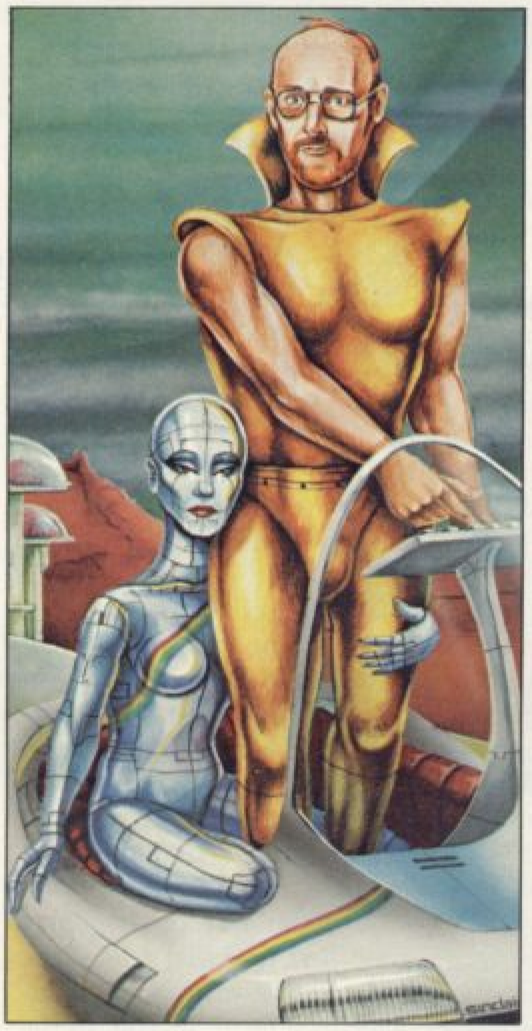
"Machines will be capable of replacing men in tasks requiring complex motor functions. Strangely I think it may be easier to make a machine to teach mathematics or Latin than to make one to play tennis, for the latter task calls for an astonishingly fine and rapid prediction and decision, coupled to precise action, but still it can and will be done. Not to relieve us of the pleasure of playing games but to relieve us of the monotony and danger of nearly as complex a task, that of driving a car.

"We took to cars for the freedom they conferred to travel from any one place to another at any time, secure from the elements. We have paid a price in the mortality of our peoples and the pollution of our lands. We have chosen to restrain these remarkable vehicles to much less than half the speeds they could readily attain to mitigate these two evils.

"The future promises a better solution. I anticipate totally automatic personal vehicles still with all the freedom in space and time of today's cars but guided by machine intelligence. They will be powered by electricity drawn from internal batteries in towns and on minor roads and from a main supply of the highways, possible coupled inductively into the vehicle. These latter-day cars will be well nigh silent and clean but, above all, free from human fallibility. They need not then be restricted to 55 or 70mph on main roads. Speeds of more than 200mph should be safely and economically possible.

"Magnetic levitation might replace wheels with advantages in the quality of ride, in silence and in the longevity of the vehicle which, having no moving parts, would need no regular servicing. It is entirely possible that the performance of these vehicles will become such as to obsolete aircraft for all but the longest journeys and those over water.

"The linking of the telephone to ever more sophisticated computing machinery is leading to major improvements in the service available. The latest of these



is the cellular radio system of communication now growing in this and certain other American cities. I see this as a partial solution to the general problem of permitting people to telephone one another, no matter when or where. It is but temporary economic restraint, not technical fundament, which bars us from the logical conclusion of truly personal telephones. Carried on or about the person, these wireless devices would allow us to telephone and be telephoned wherever we choose. I would not need to know the whereabouts of the person I was calling — only his number, since this would be particular to him wherever he was, instead of a fixed instrument as is usual now.

"I believe this is achievable by an extension of the cellular principle in area and capacity, the latter requiring much finer granularity in the system. That is to say the controlling transceivers will need to be far more closely spaced.

"It often seems that each new step in technology brings misery rather than contentment but this is because it brings change faster than benefits, and change, though often stimulating, is always disturbing. So it is and will be with the intelligence revolution but here the benefits to come handsomely outweight the trauma. Even our most intractable problems may prove soluble.

"Consider, for example, the imprisonment of offenders. Unless conducted with a biblical sense of retribution, this procedure attempts to reduce crime by deterrence and containment. It is, though, very expensive and the rate of recidivism lends little support to its curative properties.

"Given a national telephone/computer net such as I have described briefly, an alternative appears. Less than physically dangerous criminals could be fitted with tiny transporters so that their whereabouts, to a high degree of precision, could be monitored and recorded constantly. Should this raise fears of an Orwellian society we could offer miscreants the alternative of imprisonment. I am confident of the general preference.

"Intelligent robots will also help to care for the elderly who might even find companionship. Sleeplessly vigilant, the robot could provide for normal physical needs and watch for medical problems. As the intelligence of robots increases to emulate that of humans and as their cost declines through economies of scale, we may use them to expand our frontiers, first on earth through their ability to withstand environments mimical to ourselves. Thus, deserts may bloom and the ocean beds be mined.

"Further ahead, by a combination of the great wealth this new age will bring and the technology it will provide, we can really begin to use space to our advantage. The construction of a vast, man-created world in space, home to thousands or millions of people, will be within our power and, should we so choose, we may begin in earnest the search for worlds beyond our solar system and the colonisation of the galaxy."



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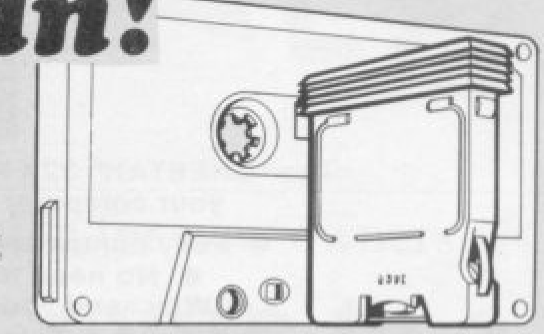
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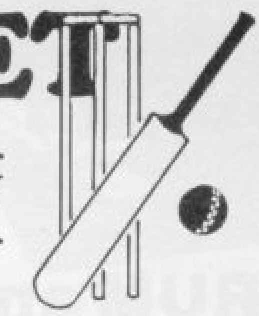
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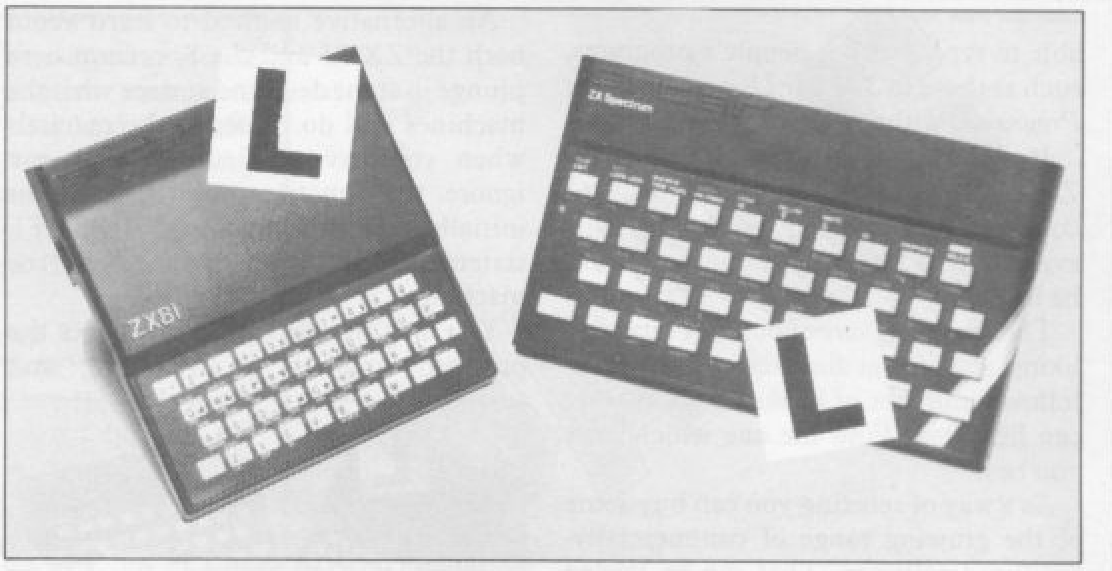
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Our easy-to-follow guide for new owners

The basic route to a habit-forming hobby

BUYING a Sinclair machine can be the start of a life-time's obsession with home computing. It is easy, however, to become discouraged if everything does not go according to plan from the beginning.

For those with only a little knowledge of computers and their capabilities, the best way to approach the machines is to abandon any ideas for special uses. While the 48K Spectrum is big enough for simple uses in small businesses, the range of Sinclair computers does not contain machines for major uses. It is better to become accustomed to the many facilities and then decide how you wish to use them.

Begin by unpacking your machine, overcoming your surprise at its size and weight and, following the manual, set up the system. If you cannot get the K on the screen, check that everything is plugged into its correct socket and re-set the machine by pulling-out the power plug for one second and try tuning-in again. If still nothing appears, check the power supply unit by shaking it. If it rattles, return it. If it is satisfactory, check your system with that of a friend.

If you have a Spectrum you will have received an introductory booklet which explains what the computer can do and giving detailed instructions on how to set it up. Also included is a fault-finding guide.

Once the K appears you are ready to begin learning about your machine. It can prevent family arguments if you can afford a separate television set for your system. It also makes life easier if you find somewhere to leave your equipment set up permanently. You will find that a few power sockets are needed and a four-way block connector on a short length of extension cable will help to tidy trailing leads.

When using a Spectrum, a television set has to be more finely-tuned than when using a ZX-81 because of the added dimension of colour. If the set is not tuned properly, the colours will look hazy instead of sharp and clear. If no colour can be seen when it is switched on, the power supply or the television set may be at fault.

Some users have experienced some difficulty with some television sets, which include Hitachi, Grundig and Toshiba. Sets which many people have found compatible include the Sony Trinitron, Fidelity and Ferguson. Recent changes in the ULA should make more sets compatible.

The manuals are written in great detail and are reasonably easy to follow. Some of the chapters may not seem immediately relevant but it is worthwhile reading them as you might miss something important.

Patience is needed at that stage to learn the ways in which the computer will accept information. It is tempting to try to enter programs before you are ready but that is likely to lead to errors. For example, words like AND, THEN and AT should not be typed-in letter by letter.

By the time you have reached chapter 11 in the ZX-81 manual and chapter 19 in the Spectrum manual you should have accumulated sufficient knowledge to be

continued on page 102

GLOSSARY

Basic — Beginners' All-purpose Symbolic Instruction Code. A programming language resembling English which is used by beginners because most popular microcomputers have it as standard.

Bug — an error in a program.

EPROM — Erasable Programmable Read-Only Memory. Semi-permanent storage. Information is not erased if the power is turned off in the computer. Programs can be erased by subjecting the memory chips to ultra-violet light. The memory can then be re-programmed using an electrical device called an EPROM blower.

Interface — RS232 and Centronics. A device which enables other computers or add-ons, such as printers, to be connected to the computer. It converts non-standard signals from add-ons to the standard signals of the computer in use.

Kilobyte — (K). A measurement of memory size. Most machines use 16K as a minimum but 48K is generally agreed to be necessary for serious work.

Machine code — an electronic pulse code used by the computer to perform functions and communicate with memory and other devices.

Mnemonics — abbreviated instructions — for example LD for Load — used in machine language programming.

Motherboard — an external printed circuit board which is used like a multi-way plug planner. It enables other printed circuit boards, such as graphics boards and colour boards, to be slotted-in.

Port — a link to the outside world which can be used by programs and the computer.

PCB — printed circuit board. A board which has on it the electronic circuits of the computer.

RAM — Random Access Memory. Information and programs can be stored in this type of memory as electronic pulses which conform to a set of numbers — machine language — in which programs are represented in the computer. When the power is turned off the information will be lost.

ROM — Read Only Memory. Information stored in this type of memory is not lost when the power is switched off.

Software — programs which control the operation of the computer.

Syntax error — a bug caused by incorrect use of a programming language.

continued from page 101

able to type-in other people's programs, such as those in *Sinclair User* and *Sinclair Programs*, without too much difficulty.

It is important when using the ZX-81 that it is not jolted. Some of the connections can easily work loose and everything which has been entered will be lost.

The manuals are not to everyone's liking and if you find them difficult to follow a number of books on the market can help you. Find the one which suits you best.

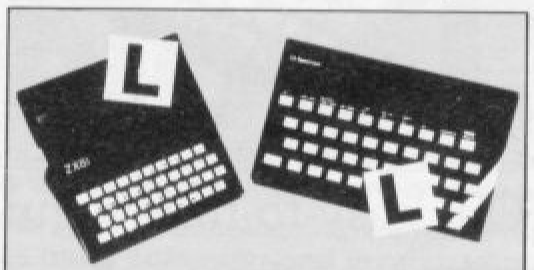
As a way of relaxing you can buy some of the growing range of commercially-produced software. That can be loaded directly from cassette but make sure that your machine is big enough to take the tapes you buy.

For the ZX-81 there are a few tapes for the unexpanded 1K machine but the majority require the 16K RAM pack. Similarly on the Spectrum most companies are taking advantage of the possibilities provided by the larger 48K machine rather than providing cassettes for the 16K.

The tapes can vary in quality and it is advisable to read the reviews in *Sinclair User* and use your judgment to find the best.

An alternative method to learn about both the ZX-81 and the Spectrum is to plunge in at the deep end and see what the machines will do. Refer to the manuals when you have difficulties. You can ignore the functions and calculations initially and experiment with PRINT statements to obtain the feel of the machines.

You may already have heard about the problem involved in SAVEing and



LOADing your own cassettes. The manual gives detailed instructions but many of the early ZX-81s would not accept tapes from some recorders. That problem is said to have been overcome but there can still be difficulties.

Usually they occur when LOADing tapes recorded by other people. One simple method to overcome this is to wind the tape to the middle of the program and type LOAD "" followed by NEWLINE; then increase the volume of the recorder slowly with the tape running until the television screen shows four or five thick black bands. If you then re-wind the tape, the program should LOAD normally.

LOADing and SAVEing on the Spectrum is much easier and faster than the ZX-81. One difference is that when SAVEing on the Spectrum the LOAD lead must be disconnected either at the recorder or the Spectrum.

Finally, a health warning. Apart from any practical uses, computing with your Sinclair machine can be a very entertaining hobby and is almost certainly habit-forming. You may easily find yourself crouched over your machine, red-eyed, in the early hours of the morning thinking that in another five minutes you will solve the problem. Try to break that habit by getting into the fresh air and meeting other Sinclair users.

By obtaining a Sinclair computer you find that you have joined a not very exclusive club with many thousands of members, many of whom would be only too happy to advise you if you have difficulties.

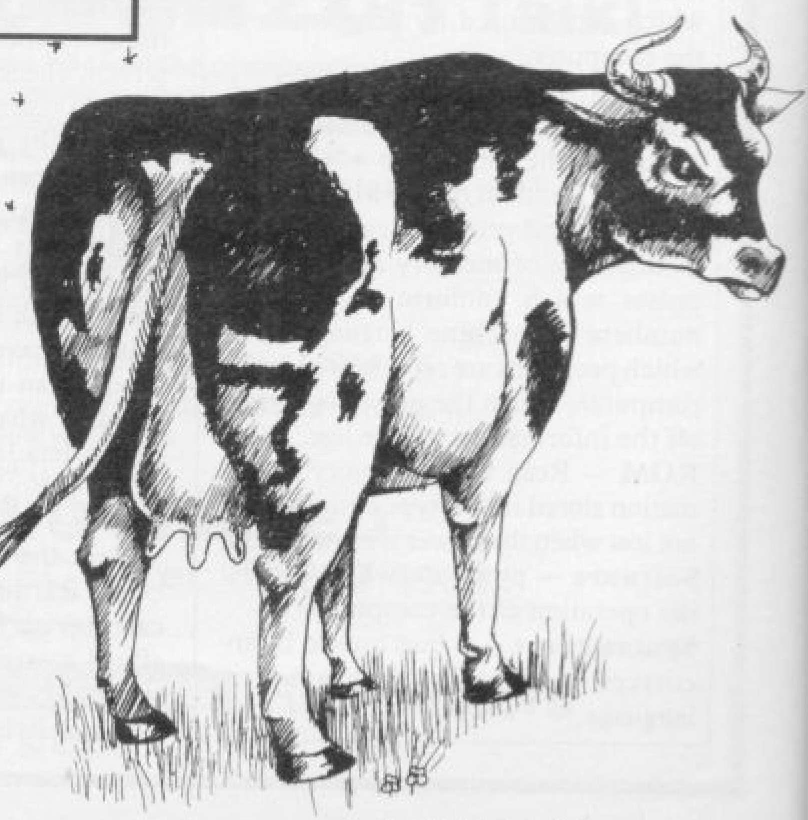
Make sure of your regular copies of *Sinclair User* and *Sinclair Programs* and you can be guaranteed many happy hours.

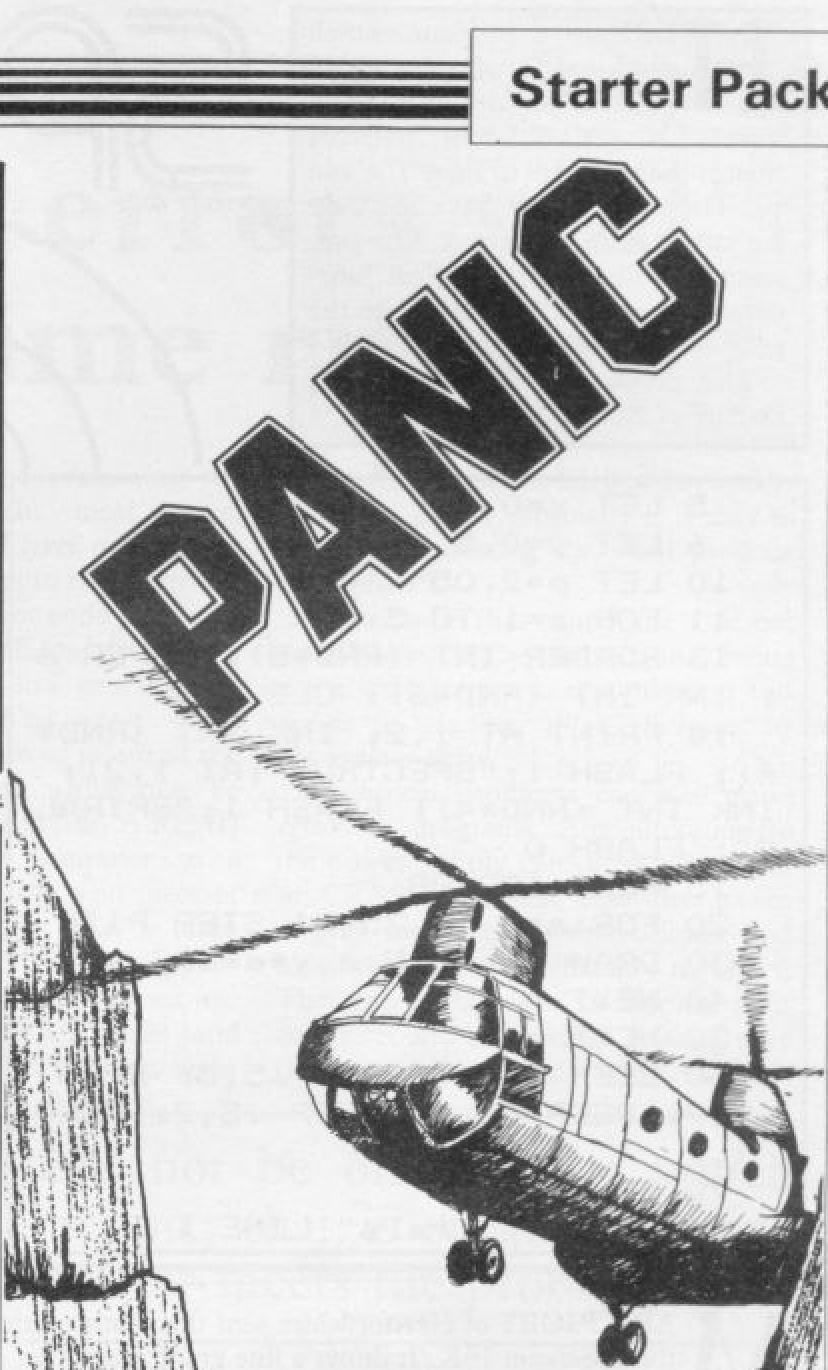
TRIANGLE AREAS

A SIMPLE WAY of finding the area of an irregular space is to divide it into triangles and calculate the area of each triangle. A four-sided figure can be split easily into two triangles, a five-sided into three, and even curved areas can be split into triangles to get approximation of the total size.

John South of Bexhill-on-Sea, Sussex sent a program which does just that on the 1K ZX-81, which he uses to calculate how much fertiliser he needs for his lawn. You must divide a plan of the area into triangles and measure each side. The program will ask you to INPUT each triangle in turn and at the end tells you how large the total area is.

```
  10 PRINT "NO. OF TRIANGLES?"
  20 INPUT A
  30 CLS
  40 LET B=0
  50 DIM C(3)
  60 FOR N=1 TO A
  70 PRINT "TRIANGLE NO. ";N
  80 LET D=0
  90 FOR M=1 TO 3
 100 PRINT "LENGTH OF SIDE ";M;"
?"
 110 INPUT C(M)
 120 CLS
 130 LET D=D+C(M)/2
 140 NEXT M
 150 LET B=B+SQR (D*(D-C(1))*(D-
C(2))*(D-C(3)))
 160 NEXT N
 170 PRINT B
```





PANIC by Aaron Day squeezes a fast-moving arcade game into the 1K ZX-81. You must steer your helicopter through the obstacles and land it on the mountain, using cursor keys 6 and 7 to control your machine. Day has used a number of sophisticated space-saving techniques to fit the program to the memory, including a short machine code routine. You must enter that separately.

Type in line 1 of the program and then type the following: POKE 16514,42 NEWLINE POKE 16515,14 NEWLINE POKE 16516,64 NEWLINE POKE 16517,78 NEWLINE POKE 16518,6 NEWLINE POKE 16519,0 NEWLINE POKE 16520,201 NEWLINE. Then type in the rest of the program. You will see that the REM statement contains a jumble of characters; that is the little machine code routine.

```
   1 REM XXXXXXXX
   5 FAST
  10 FOR F=SIN PI TO CODE "G"
  20 PRINT AT RND*10,RND*22+2;"▒
"
  30 NEXT F
  40 PRINT AT 10,25;"▄███▄";AT
9,26;"▄██▄";AT 8,27;"▄▄"
  45 SLOW
  50 LET X=CODE "▪"
  60 LET Y=SIN PI
  70 PRINT AT X,Y+1;
  80 LET P=USR 16514
  90 PRINT AT X,Y;"█>"
 100 IF P=136 THEN PRINT "CRASH"
 110 IF P=136 THEN STOP
 120 PRINT AT X,Y;"  "
 130 LET Y=Y+1
 140 IF Y<CODE "." THEN GOTO COD
E "COS "
 150 IF X=CODE "▛" THEN GOTO COD
E "█"
 160 PRINT AT NOT PI,NOT PI;"YOU
 MISSED THE MOUNTAIN"
 170 STOP
 180 PRINT AT 2,NOT PI;"YOU LAND
ED"
 190 STOP
 200 LET X=X+(INKEY$="6")-(INKEY
$="7")
 210 GOTO 70
```

In Sinclair Basic it takes much more memory to hold a number than a letter — six bytes instead of one. Day avoids that by using expressions such as CODE "G" or NOT PI which are numerical values. In the appendix to the ZX-81 manual you can find a full list of all the CODE values. See if you can determine what numbers the other expressions represent.

Line 1. The REM statement contains the machine code routine. Last month we published a program — Frogger — which used a Basic line to read the screen and see if there was anything on-screen at the point where the next character was to be printed. The machine code routine here does the same thing in even less space.

Lines 10-30. Print-out the obstacles at random over the playing area. The character in line 20 is a grey square. You can write it by typing SHIFT H in graphics mode.

Line 40. Prints the mountain.

Lines 50-60. Set the initial co-ordinates of the helicopter.

Line 70. Gets ready to print the helicopter.

Line 80. Calls-up the machine code routine in the REM statement, which looks at the space to print the helicopter. If that space has an obstacle, P will be given the value 136.

Line 90. Prints the helicopter.

Lines 100-110. Check for a crash. If P=136 you have hit an obstacle.

Lines 120-130. Print a space where the helicopter was and increase the Y co-ordinate. That is necessary because the helicopter is two characters long.

Lines 140-190. Check your position relative to the mountain. The mountain is always in the same place, so there is no need to use the machine code routine. If you have landed at the proper point or missed it completely the game stops.

Line 200. The INKEY$="6" expression has the value 1 if you are pressing key 6, similarly for INKEY$="7". Otherwise it is zero. The whole line adjusts the co-ordinates by one depending on which key you are pressing.

Line 210. Returns to line 70 ro re-start the game process.

SPIRALS

HERE IS a program which produces attractive spiral patterns for the 16K Spectrum. To get different patterns change the numbers in lines 5, 6 and 10. The numbers we have used are the largest ones permitted. The program uses the trigonometrical functions SIN and COS to calculate the points from which to draw.

The program was written by J Bourne of Bexhill, Sussex.

```
   5 LET x=0.5
   6 LET y=0.5
  10 LET p=2.05
  11 FOR z=1 TO 3
  13 BORDER INT (RND*5): PAPER 6
: INK INT (RND*6): CLS
  14 PRINT AT 1,2; INK INT (RND*
4); FLASH 1;"SPECTRUM";AT 1,21;
INK INT (RND*4); FLASH 1;"SPIRAL
S"; FLASH 0
  15 PLOT 128,88
  20 FOR a=0 TO 75*PI STEP PI/p
  30 DRAW x*a*SIN a,y*a*COS a
  40 NEXT a
  50 NEXT z
  60 BEEP .5,1: BEEP .5,3: BEEP
.5,7: BEEP .5,4: BEEP .5,2: BEEP
 1,1
  70 GO TO 1
  80 SAVE "spirals" LINE 1
```

LINE GRAPH

MARK RIGBY of Hertfordshire sent this mathematical program for the Spectrum 16K. It draws a line graph from a set of figures. The graph plots each point as you enter it and draws a line to connect it with the previous point. You must first set the maximum range of the numbers to be plotted.

Lines 10 and 50 include a few special abbreviations used when listing programs in *Sinclair User*. A full explanation of those abbreviations is found on page 67 of Program Printout.

```
   5 LET s=2: LET q=20: LET t=2
3
  10 PRINT "maximum value to be
plotted on(2*sp)graph?"
  30 INPUT max
  35 LET z=18/max
  40 CLS
  50 PRINT "a maximum of 36 numb
ers can be(2*sp)inputted(30*sp)t
ype -2 to STOP(17*sp)and -3 to l
eave a gap(3*sp)"
  60 PAUSE 300: CLS
  90 PRINT AT 1,0;max;AT 10,0;ma
x/2
 100 PLOT 16,16: DRAW 0,144
 110 PLOT 16,16: DRAW 144,0
 130 FOR n=24 TO 162 STEP 8
 140 PLOT n,16: DRAW 0,-5
 150 PLOT 16,n: DRAW -5,0
 160 NEXT n
 255 PRINT AT 1,23;"numbers?"
 260 FOR j=1 TO 36
 270 INPUT a: BEEP .05,20
 275 IF a>max THEN  BEEP .8,-20:
IF a>max THEN  GO TO 270
 280 IF a=-2 THEN  STOP
 290 IF a=-3 THEN  LET x=x+4
 295 IF a=-3 THEN  GO TO 370
 296 PRINT AT s,t;a
 297 LET s=s+1
 300 LET b=((a*z*8)+16)
 320 IF j>1 THEN  GO SUB 600
 330 PLOT q,b
 340 LET d=b
 350 LET x=4
 370 LET q=q+4
 380 IF j=18 THEN  GO SUB 500
 390 NEXT j
 400 STOP
 500 LET s=2: LET t=27
 510 RETURN
 600 LET c=b-d: DRAW x,c
 610 RETURN
```

Trapping the errors will ensure first-time running

THE FIRST error code encountered by most Sinclair users is the flashing "S" on the ZX-81 or "?" on the Spectrum, which indicates a syntax error in a sentence. Experience and the manual soon show that it is caused usually by typing-in a keyword letter by letter, or by bad punctuation, for example omitting a semi-colon or an inverted comma.

The most frequently-occurring error code is "2" — variable not found. A variable is a letter which has been given a numeric value. When you enter "LET a=2" you are defining a variable. Error code 2 results when the computer reaches a variable in the program to which you have so far given no value.

Check the line which the computer specifies. If it is your program, give a value to the variable or remove it. If you are copying the program, look back in the listing to see which line you have missed.

Although the majority of error codes are explained adequately in the manuals, the report "B-Integer out of range" can be confusing. An integer is a whole number — 1 is an integer, 1.5 and 1½ are not. That code occurs most frequently when you try to print something beyond the limits of the screen.

PRINT AT 0,31; "a" is acceptable and will print a letter "a" at the top right of the screen. PRINT AT 0,32; "a" would not be possible. The integer 32 would be out of range, resulting in error code "B". That would also happen if the computer were instructed to PRINT AT 0,31;"ab". It would still be trying to print a character beyond the limits of the screen.

That error is more difficult to detect if variables have been used as co-ordinates and your character, or series of characters, is being printed in varying positions. If the instruction PRINT AT 0,x;"a" produces report code B, make sure that the value of x never increases beyond 31.

On the Spectrum "B-integer out of range" is also often found when you are POKEing-in user defined graphics. The biggest number which can be POKEd-in this case is 255 or BIN 11111111. In that case the error code will occur in the line containing the POKE statement. In most cases, though, the error will have occurred in one of the DATA lines in the program.

A very frequent error code produced on the Spectrum is "E-Out Of Data". That will occur in a line containing a READ statement. The error code, though, will have occurred in one of the program DATA lines, which may be nowhere near the READ line. A READ command sends the computer to a DATA line to collect the next piece of DATA contained there. That is often done using a FOR, NEXT loop, especially when graphics are being set up.

FOR n=1 TO 8: READ n will send the computer to the DATA lines eight times, for eight separate pieces of information. If there are only seven pieces of DATA there it will return to the READ line and produce the code OUT OF DATA. When there are several DATA lines they will all have to be checked, because the piece of DATA you have omitted was not necessarily the last.

In some cases the computer will follow the program correctly, without producing an error code, but from the programmer's point of view the program contains an error. In that case BREAK into the program at the moment it goes wrong. That will produce report code 9 and the line on which you have STOPped the program. That method makes it easy to locate the area of the program which contains the error.

Programs which you copy from magazines, books or from friends can be difficult to error-trap because they contain programming techniques which you have not yet learned, or simply because it is often difficult to follow another programmer's logic.

The flashing "S" or "?" indicating a syntax error may appear frequently. In that case check carefully what you have copied. You may not have recognised words such as LN or EXP as keywords.

On the ZX-81 especially it is easy to forget that pressing "π" will produce the word PI.

Make sure that when the "is not equal" sign, "< >" appears in a listing you always enter it as one character and not as "is less than", "<" followed by "is greater than", ">".

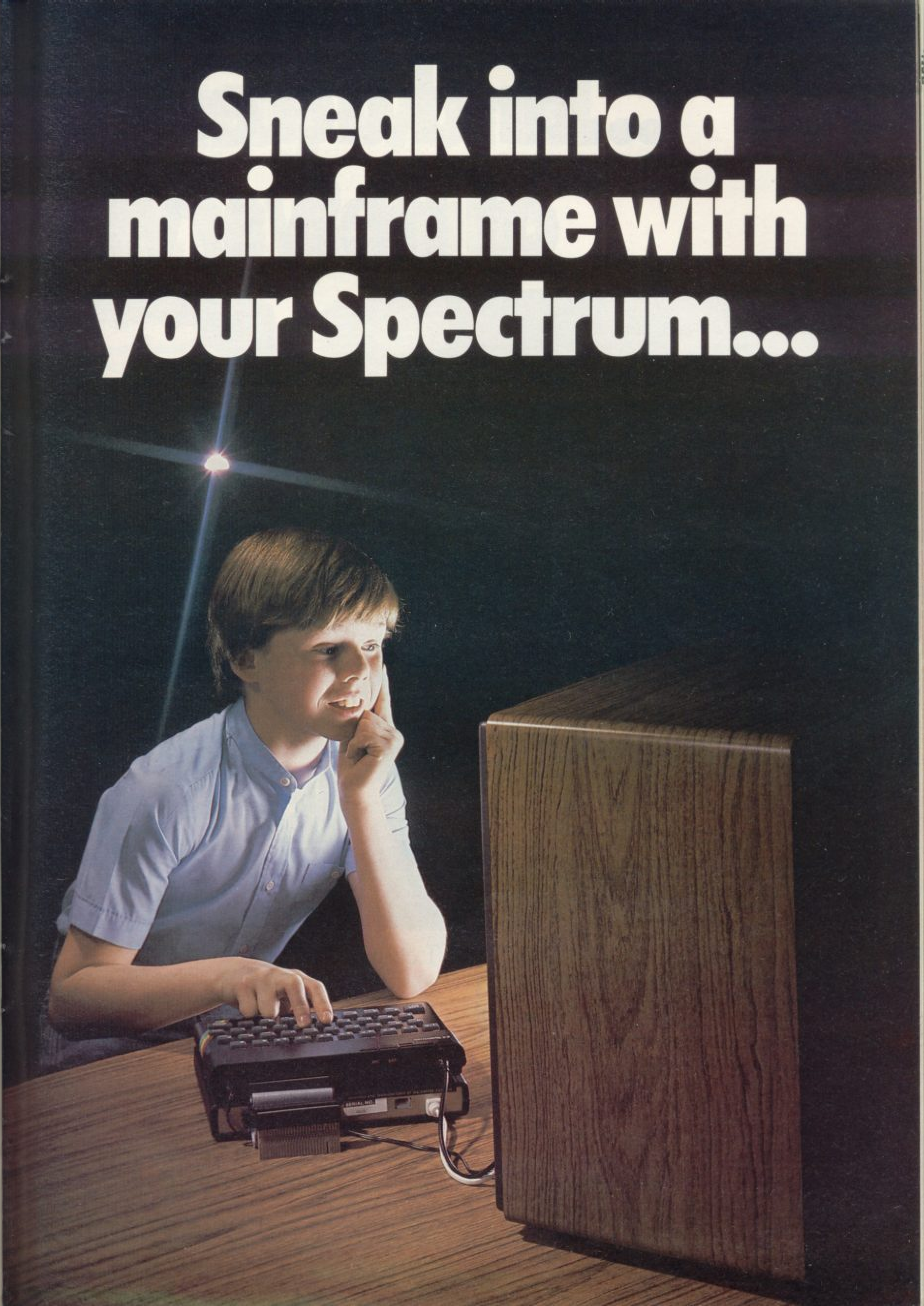
Technical problems can also cause errors in programs. Any alteration to the power supply can cause a program to CRASH. In that case the screen display may change dramatically and using the keyboard will have no effect. The only solution is to unplug your computer and begin again, making sure that your power supply and RAM pack are both connected firmly. That error is caused by the computer and not by the program.

> 'The error need not be on the line which produces the report; that is simply the line where the computer meets the problem'

Sometimes a program listing in a book or magazine will contain what seems to be a very obvious error. If it contains key words or symbols which are not on your computer, check that it is intended for your machine. Programs for the Spectrum, the ZX-81 and the ZX-80 are not usually directly interchangeable. If a program contains the command GOTO or GOSUB — a non-existent line number — the computer will simply go to the next numbered line after that one. That is a sign that a program has been developed and improved and is rarely an error.

When you have errors in a program, first check the report codes listed in Appendix B of the manual. It may then be necessary to read the appropriate section of the manual. Remember that the error is not necessarily on the line which produces the report code; that is simply the line where the computer meets the problem for the first time.

Always check carefully every line connected with the line containing the error code and the mistake should be easy to locate.

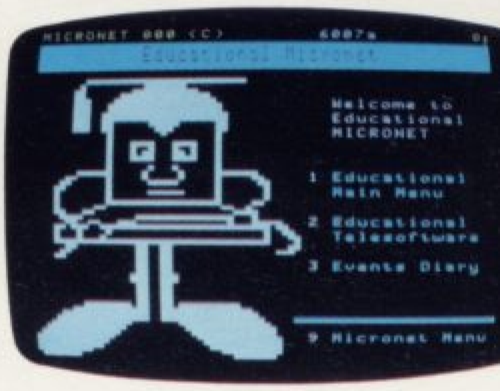

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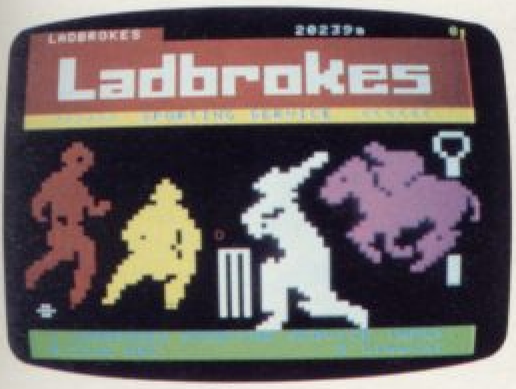
News



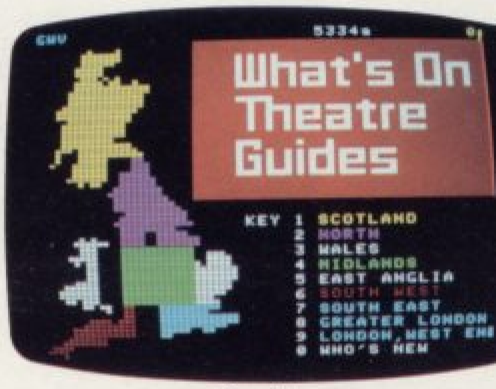
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SU 8

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Digging up the past

Archaeologist Paul Brown tells Chris Bourne how his Spectrum helped excavate an Iron Age village



AS MORE and more acres of farmland and forest are sacrificed on the altar of industrial development, rescue archaeology becomes increasingly important as a means of documenting Britain's heritage before the bulldozers move in. Lack of public funds usually results in all but a few excavations being carried out primarily by amateur archaeologists motivated solely by a love of history and an apparent ability to wield their trowels tirelessly in pursuit of buried treasures.

One such archaeologist is Paul Brown, a founder of the Malden Archaeological Group in Essex. He received an award of £200 recently for the group on the strength of a program he wrote for the 48K Spectrum, **Pitcalc,** which proved invaluable last year on a particularly troublesome operation.

An area of farmland outside Malden had been designated for gravel extraction but it was also the site of an Iron Age farm. The over-riding factor in rescue archaeology is time—the site had to be excavated literally as the contractors moved in to scoop out the gravel.

While archaeological digs occasionally produce spectacular treasures, one of the most important aspects is not simply concerned with the objects discovered but precisely where they were found. By creating an accurate plan of the site showing the exact position of even the smallest piece of broken pot or bone it is possible to learn a great deal about the site as a whole. The Pitcalc program was written to enable the group to produce that data at high speed, in spite of the special problems involved with gravel pit operation.

The program uses bearings to calculate the position of objects. In the field, Brown takes three or four theodolite bearings on known fixtures and records them in his notebook. They might be buildings, trees or telegraph poles — anything which stays in one place. The distance between those reference points is measured and entered into the program, which can store details of up to nine reference points to save typing in the same figures over and over again. Because accuracy is so important, the four-bearing program also produces a figure for the limits of accuracy.

Brown bought a Spectrum at Christmas, 1982. He works as a technical officer for British Telecom and says he enjoys learning about electronics matters through practice. "I did not do very well at college," he says. "I prefer learning through playing around."

The main reason for buying the Spectrum was to help with the archaeology group but he also wanted to learn more about computers, as his work did not take him directly into contact with them. "I also bought it for my two-year-old," he says, "but that was an excuse really."

He chose the Spectrum because of its price and adaptability. The decision was influenced by his hopes of writing useful archaeological applications which could then be used by other groups. It seemed sensible to buy a machine which was popular and supported by a range of software if his programs were to be used elsewhere.

"I respect the machine more now I have got to know it", he says. "It was a long time before I wrote the program we use now. It was not easy to program and very time-consuming."

The group has used the £200, which was awarded to it by Lloyds Bank, which has a fund to sponsor independent archaeologists, to buy two Microdrives. "They have made a tremendous difference," says Paul. "Now we can analyse the data in an hour or so. I have been writing programs to make them easier to handle, with single-key entry to any program."



The Microdrives, which the group acquired two months ago before receiving the cheque, were not without problems.

One of the cartridges refused to format and it took more than six weeks to obtain a replacement from Sinclair Research. When the replacement arrived it was equally stubborn. Brown lost an hour's work but he is phlegmatic about such difficulties, believing that the products speak for themselves. "That is why Sinclair can get away with things others cannot," he says.

The Pitcalc program has been expanded from the version used last year on the Lofts Farm dig at Malden and now includes several refinements. There is a program to calculate the size of ring ditches from measurements on small sections of the ditch, which may be the only remaining features of the original structure, and another program to calculate the distances between the reference points used in the main Pitcalc program.

A final refinement is a program to convert polar co-ordinates into ordinary cartesian co-ordinates so that the results of the survey can be entered easily on a large-scale grid map of the site.

The program is now being sold by the group for £5 and at the awards ceremony it generated considerable interest. "I am surprised at the number of people who have asked about it," Brown says. He is hoping to be able to generate funds for the group by selling the program commercially and believes that as a general trigonometrical calculator it might be of interest to schools.

"I like to manipulate programs to make them work the way I want them to do" he says. "I hope people will be able to break into Pitcalc and write their own variations".

He is looking into the possibility of setting up a user club at Malden and even writing games programs based on the town and its history, perhaps for the educational market, as a means of promoting indirectly the archaeological significance of the area, which has been occupied continuously since prehistoric times.

Brown is married with a young son, Jonathan. Unlike many women who find their husbands' addiction to microcomputing isolates them, with Elaine Brown the Pitcalc program has had the reverse effect, eliminating the time-consuming drudgery of calculations when they return home from the dig.

She uses the computer with Jonathan, who has some spelling and counting programs, although she recalls one disaster: "Paul was working late one night", she says, "and I stayed up to keep him company. Unfortunately I switched off the program and all the work was lost. Luckily he is one of those terribly pleasant people."

She shares her husband's keen interest in archaeology and is an active member of the group. She says Paul frequently wakes at 5am to go to the site and excavate before workmen arrive to start digging the gravel. He also goes every lunchtime and after work.

"The contractors were very helpful," she says, lest you should imagine there is conflict between the industry and the archaeologists. "They have given us money and are very good about backfilling". Back-filling is the process of filling in the pits to repair the landscape after the gravel has been extracted.

When the mechanical monsters arrive they first scrape the topsoil to lay the gravel bare. At that point the archaeologists move in to check for possible finds. There the program is particularly useful, as not only are the contractors anxious to press ahead but the gravel moves as the digging continues and it is very difficult to measure

continued on page 112

continued from page 111

distances using traditional marker pegs and tapes.

"Obviously they have to meet their schedule," says Elaine. "We work with the machine drivers wherever possible." Sometimes they lose finds nevertheless and Elaine recalls a moment when she picked up one part of a pot and then had to watch as the machines obliterated the remainder of it.

Whether or not Pitcalc is a success with other groups, Brown is already working on more applications for the Spectrum. At present the group is using the machine to make labels and also as an advertising aid.

"To have to go to a shop and use a photocopier is time-consuming and awkward," he says. "I always have a project I wanted to do and I am now working on data storage programs with the Microdrives."



He explains that the Malden group is primarily a collection of people with a shared interest in the history of the town but they all have their personal enthusiasms in archaeology. Although the others are not very interested in computing the group has been keeping an eye on new techniques and technological developments in archaeology.

Even though the program was not used during the early part of the dig, because it had not been finished, Brown says it would not have been possible to produce such a comprehensive plan of the site without it — certainly not quickly.

With many people seeing the advent of the new technology as a force which will obliterate traditional ways of working and living, it is pleasing to find one man who has put the micro to work to help preserve our heritage and make it easier for archaeologists to dig up and interpret finds, rather than spending days and weeks compiling tables of statistics.

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fantasy
SOFTWARE
"Ziggy turned, his fingers clutching the trigger of his capsule gun, something had startled him or had it?
He looked back, he had grown very tired from his many exploits in THE PYRAMID negotiating 120 different chambers and coming face to face with some pretty nasty aliens.
No sooner than he had accomplished this mission, he was summoned by Time Lord Hamilton (known as Super Ham to his friends) to go to DOOMSDAY CASTLE and to save the Universe from the infinitely evil Scarthax, this being no small task took several megayears. By this time Ziggy was completely exhausted, his capsule battered, dented and wobbling as he limps in the direction of home, a real super hero of our time. Unable to leave the Universe undefended he radioed his great friend and colleague Beaky on the planet of Crackit to stand guard until his return.
Beaky would normally assume this role without a second thought, however he had his own problems to face for the dreaded Eggsnatchers had returned to threaten the very existence of his breed. Beaky's survival instincts do not allow him to leave Crackit until he has reared enough chicks to fight off the Eggsnatchers. In order to crack it, he must pass through 12 different stages each getting progressively harder.
So we have it, Ziggy returning home for a complete refit under the illusion that Beaky is defending the Universe, surely it can't take Beaky that long to secure his own species and when will Ziggy be back.....?"
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FANTASY SOFTWARE,
Fauconberg Lodge, 27A St..George's Road,
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Contents

Below, Psion replies to Vu-File criticism and a reader tackles the Q Save—ZX-81 problem.

On page 118 we assess Spectrum stock control.

SINCLAIR BUSINESS USER

August 1984

Psion and the Microdrive

I SHOULD like to reply to John Hurdley — Business Letters, June — regarding Vu-File for the Spectrum. The issue he raised is not a clear-cut one. In providing the means to transfer cassette software to microcartridge one opens the door to unlimited copying, any software protection having been by-passed to achieve the transfer.

Our policy has been to assist the individual user but not to publish widely the method of transfer. For some months we have been replying to user inquiries with two pages of detailed instructions on how to transfer Vu-File and Vu-Calc. It is difficult for these programs because of their nature and structure and the fact that they are a very tight fit into a 16K Spectrum.

I am not sure why Hurdley did not receive our standard reply but should he wish to contact us again we will forward full instructions to him, as indeed we will to any other user.

While we are very keen to do our utmost to reduce the spread and ease of software piracy, we also endeavour to provide a high level of support to users. In this case we feel that assisting on an individual basis, rather than publishing, is the best course for achieving those aims.

I would also like to mention that work is under way on microcartridge versions of Vu-File and Vu-Calc but that the timing of any release depends on the availability of microcartridges, which are still in short supply.

Peter Norman,
Psion Ltd,
London NW1.

Q Save help for ZX-81s

IN ISSUE 27 you published a letter from J P Heritage who was having difficulty with a ZX-81 and the Q Save system. It is an excellent system which I have used in a small hairdressing business for more than a year. The procedure is as follows:

Set up system with 64K RAM but not the printer interface. Set 64K pack to mode "e".

Switch on. Load 64K Q Save program.

Amend program as listed here. Q Save instructions under how to re-locate program will help.

Save new program by using GOTO 40.

Then to use the new program, set up system with 64K pack and printer interface. Set 64K pack to mode "b".

Load modified Q Save and use with the following commands:

a Load with named program
PRINT USR 12294;
"****"

b Save named program
PRINT USR 12288;
"****"

c Verify save
PRINT USR 12300

d Load next program
RAND USR 12312

e Print name of program
RAND USR 12306

```
  3 REM
 10 POKE 17031,125
 20 PRINT USR 17032
 25 POKE 16389,PEEK 17031
 30 STOP
 40 SAVE "Q SAVe"
 50 POKE 17031,(12208/255)
 60 RAND USR 17032
 70 FOR C=1 TO 80
 80 PRINT AT 15,5;"64K
QSAVE HAS LOADED"
 90 PRINT AT 15,5;"
31 SPACES "
100 NEXT C
110 POKE 16389,255
120 NEW
```

B K Gibbs,
Croydon, Surrey.

Breach of copyright?

WITH REFERENCE to the letter from John Hurdley in the June issue regarding Vu-File on Microdrive. My software house has produced software which, when added to Vu-File, allows it to operate from Microdrive and also has the ability to load files from cassette tapes.

I do not believe we are breaching copyright because I think all computer owners have the right to make a back-up copy of software they have purchased to safeguard their investment, which may or may not involve the use of a different storage medium.

Dave Lucas,
DraySoft,
2, Bedford Way,
Rugeley,
Staffs WS15 1LB.

Limited programs

MAY I agree wholeheartedly with your reader W C Carney and the contents of his letter in the May edition. There must be many people who have written programs which have a very limited demand. He has written one for the analysis of rigid jointed frames; I have written one which, among other things, calculates the maximum contribution an applicant for Criminal Legal Aid must pay and the rate at which he pays it. May I suggest that you devote one page of your magazine per month to the free advertising of such programs? It would assist readers and bring the programs to the attention of a wider public.

P Brough,
Clerk to the Justices,
Cynon Valley and
Upper Rhymney Valley
Divisions,
Aberdare, Glam.

● *If readers have written programs such as the ones mentioned, please send details to* Sinclair User *and we will consider publishing an occasional list of addresses in the business section of the magazine.*

Spectrum in the store

Mike Wright takes stock of three programs for small businesses

STOCK CONTROL for small businessmen, such as shopkeepers, is often a matter of looking at the shelves while working, noticing where stock is low and re-ordering. In such circumstances is there any point in having and using a stock control program? In attempting to answer that question we look at three stock control programs from Hilderbay, Transform and Kemp.

All the programs are driven from a master menu followed by a combination of prompts and secondary menus. They all feature the basic requirements of information on line, supplier, unit cost, stock level and re-order level and offer the ability to add and deduct stock.

Any changes in unit costs affecting the total value are, however, dealt with differently. The main differences are in the way the output is presented and each has features which make it attractive to possible users.

The Transform program holds up to 900 lines. On loading, the program prompts for a file name for the data before displaying the main menu. That offers eight options, including update stock, list stock, deduct stock and print all details. The four remaining options are used for saving and loading the stock list and/or the program. The options are all selected by a single keystroke.

Option one is used for entering the stock details in the beginning and then updating the details at a later stage. When selected, a secondary menu is offered. That is headed Search facility and offers six options — 1, to enter new stock item; 2, to search for a supplier; 3,

Total value=£0

[illegible]			
1	fizzbangs	36	£0.14
2	buzzers	112	£.02
3	yorkers	205	£0.29
4	mintels	64	£.09
5	gumboes	84	£.05
6	peanut yorkers	33	£0.3
7	cont asstd 1lb	25	£1.5
8	cont asstd 1.5l	20	£2.37
9	cont asstd 2lb	15	£2.88

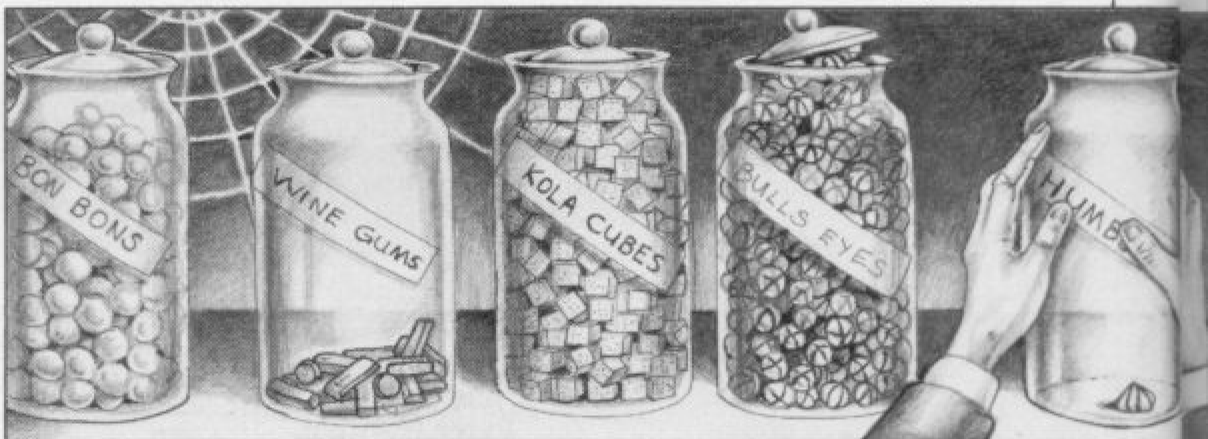
Date:310584
Total: £214.69

Transform

to search for details of stock; 4, to search for stock number; 0, to scan pages; ENTER to return to main menu.

Selecting option one displays the bare details of the line. Those are stock number, line, supplier, unit price, stock level, re-order level and value of stock. The stock number is assigned by the program and the other details are prompted for one by one. When the details have been completed another menu is displayed in the lower half of the screen.

That on-screen menu allows changes to be made to any of the details, searching on a stock number and scanning backwards and forwards. To continue entering new stock lines is simply a matter of pressing ENTER. The other



options can then be used to search for the supplier, the line and the stock number or to scan through the lines.

Adding or deducting stock can be done using any of the search options on the Search facility menu to display the details of the line and then selecting option two to deduct stock or option seven to add stock. The program prompts for the amount of stock assuming the current unit price. If the unit price is changed the total value of the stock is calculated at the new rate.

Option two allows listings of the lines of stock to be made by all-lines, supplier, low stock levels, or supplier and low stock. Every time an option is chosen a printout or screen display can be selected. The all-lines option also allows the user to choose the first stock number from which the listing will start and gives the last used stock number. Stock can be deducted also using option three on the main menu which asks for the stock number and when the details are displayed the amount of stock is entered.

The cassette insert states that with that option the program can be used easily beside a cash register. It is possible that having the cashier remember the stock number for each line would create more difficulties than it solves. Certainly it is easier to use the search facility to deduct stock.

Although the only manual is the cassette inlay, which contains the barest information on running the program, it is remarkably easy to follow and use. Nearly all options are selected by a single keystroke. The exceptions are for printing and deleting a line. The method of displaying the details on a line is one of the most compact and yet clear and informative to be found.

In contrast, the Kemp program is fussier in its approach but incorporates more safeguards against accidental errors. The user is asked first if the loaded program is to be verified, then for a two-letter security code — which is set up on the first run — and then the date. After that a nine-option menu is presented. Creating a new line is done from option four. The details are stock number, description, supplier, unit cost, re-order level, present stock level and stock value. Unlike the Transform program the stock number is alphanumeric — numbers and letters — and is user-definable

STOCK LISTING 310584

No./Descpn	Quantity	Value
1 fizzbangs	36	5.04
R2 buzzers	112	2.24
3 yorkers	205	57.38
4 mintels	64	5.76
5 gumboes	84	4.20
R6 peanut yorkers	33	9.90
7 cont asstd 1lb	25	37.50
8 cont asstd 1.5lb	20	48.05
9 cont asstd 2lb	15	43.20

Stock Total 213.24

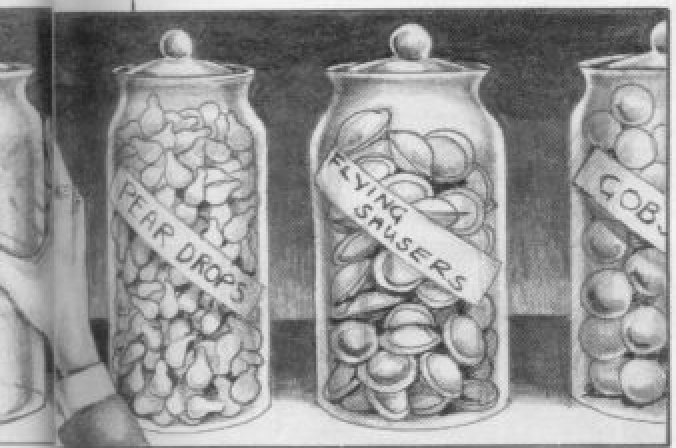
Kemp

up to four characters. As each value is entered it is displayed.

Having realised that each item is being prompted for in turn, it is a shock to find the program asking for the date

again — a reference which does not appear to be used elsewhere — and then the type of transaction, for instance goods in or out, when all you might expect to enter is the present stock level.

After the transaction type, the amount of stock is prompted. That is followed by a prompt asking for the value of the stock. Entering u calculates the value of the stock at the unit cost and adds or subtracts that from the total value — initially zero. Alternatively, a separate total value can be entered. The same procedure is used for updating the details — option two — as well.



There is, unfortunately, no way of skipping from one line to another when updating and once the details have been entered a return must be made to the main menu before updating another line. Corrections can be made to line details or the line deleted using options three and four respectively. Before those can be used the access code must be entered again.

A display of the details on a single line can be obtained from option one; a listing of the amount and value of all lines is given using option six, while option seven displays the total value of all stock. Option eight allows the lines to be searched and itemised by either description or supplier. Despite a maximum of 20 characters per description, the search is done on the first four letters only. A list of lines with low stock levels is given by option nine which allows also all stock to be revalued at unit cost, again after the access code is given.

Saving and loading is easy. To save a file press e and ENTER on the main menu. The saved version is then used to load both program and data next time.

In running the program a printer needs to be attached permanently, as a printout is made automatically at nearly every stage, creating a paper chase for the auditors. The need to enter every option seems tedious after using single keystrokes to select options, as is the need to enter the date at every transaction.

The Kemp program is probably the most sophisticated of the three and that is indicated by the packaging and the level of error-trapping. Perhaps, however, you would rather forego some of the sophistication for a slightly more usable program.

The Hilderbay program differs from the others in that you are allowed to specify the number of characters used for the details of the lines. The program also allows for an additional amount of text to be specified for each line. The length of the text is also prompted for when setting up the program.

The maximum number of possible lines is calculated from the total number of characters in the lines and text. That is displayed while the user is asked for the number of lines to be used.

Once that and a file name have been specified the five-option main menu is displayed. Option one allows a line to be found, added or deleted. On selecting the option the line description is asked for and, if found, the details are displayed. If the line is not found, either a new line can be entered or return to the main menu. If a new line is set up the user is prompted for the unit price, a supplier code — between 0 and 255, a type code — 0 to 255, stock level and re-order level.

Once the details have been entered they are displayed on-screen with a further menu which allows stock changes, alterations to re-order level and unit value to be made. Available also is the ability to add to the text, delete a line and move backwards and forwards in the list.

As the lines are entered they are sorted automatically into alphanumeric order. On opting to make a change to stock the user is prompted for the change in stock — a minus sign is used to show a deduction — and additions are made at the current unit value. If additions are to be made at a different unit value then the Alter unit value option should be used. That prompts for the new value and asks for the number of items at the new value — attempting to enter a negative value causes the program to crash. If 0 is entered the unit cost is changed to the new value and a new total value calculated. If any other number is entered an average unit value for the stock is calculated.

A useful feature is the line of text which can be used for suppliers' addresses, contacts or other information.

Selecting the second option gives a

```
stock
Line                St   Su Ty   Val.
buzzers
                    112  1  1    .02
cont asst 1.5lb
                    20   3  1    2.37
cont asst 1lb
                    25   3  1    1.5
cont asst 2lb
                    15   3  1    2.88
fizzbangs
                    36   1  1    0.14
gumboes
                    84   3  1    .05
mintels
                    64   3  1    .09
peanut yorkers
                    53   2  1    0.3
yorkers
                    205  2  1    0.277
Total value = £212.025
```

Hilderbay

subsidiary menu offering print options. That allows lines to be listed by supplier and type, re-order levels, text or by 'everything'. Because of the amount of information to be printed the 'everything' option can be selected only when using an 80-column printer.

Unfortunately the program is poorly protected from accidental errors in data entry. Considering the high standard of the other Hilderbay programs you might be disappointed with this one.

Overall, if you are looking for a stock control program it would seem to be a choice between the Transform or Kemp programs, unless you specifically require the text or averaging unit value features of the Hilderbay program.

	Transform	Hilderbay	Kemp
No. of lines	900	variable	518
No. of characters per line	15	user-definable	20
No. of characters per supplier	5	1	4
Low stock indicator	yes	yes	yes
Space for comments	no	yes	no
Cost	£10.75	£25	£14.95

Transform,
41 Keats House,
Porchester Mead,
Beckenham,
Kent. Tel: 01-658-6350.

Hilderbay,
8-10 Parkway,
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London NW1 7AA. Tel: 01-485-1059.

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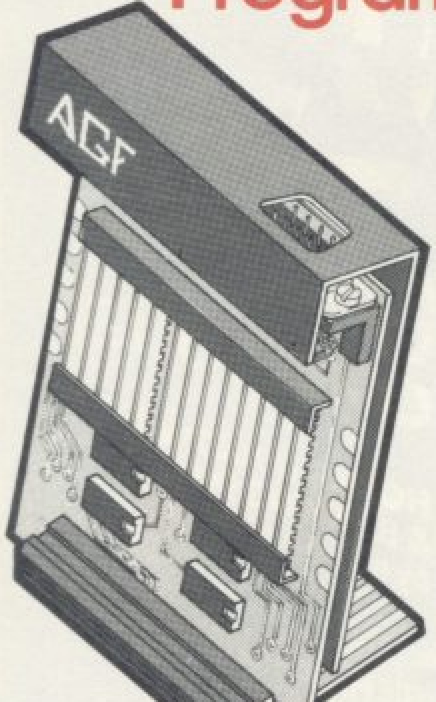
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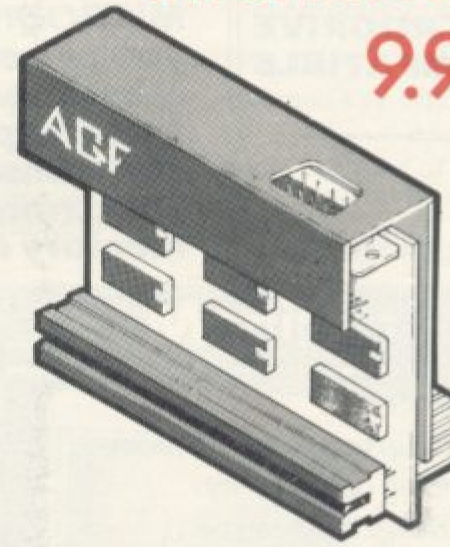
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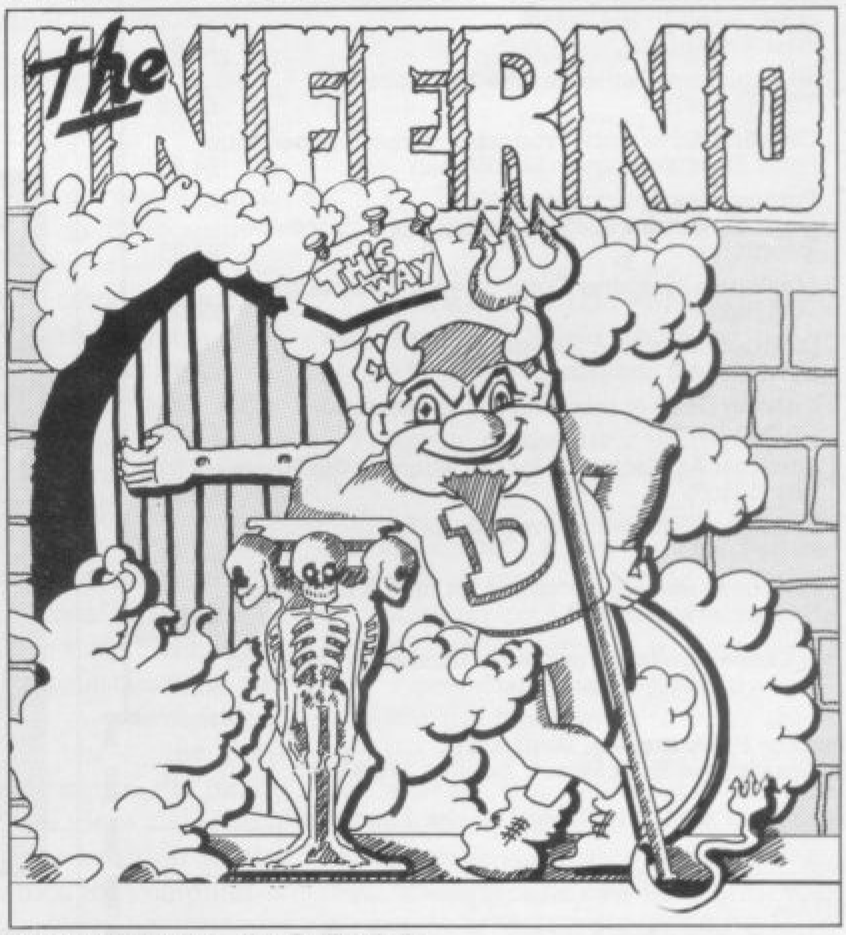
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49 Explosive Games for the ZX Spectrum
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FOOTBALL MANAGER

Positional play

Quentin Heath makes an intelligent move and shows how to program for strategy

TO PLAY traditional games such as chess, and adventures like **The Hobbit,** a computer must not only have some idea of the conditions or rules of play but it must also be able to evaluate its moves depending on the way in which its human opponent reacts.

To make a computer play against a human, the programmer must get away from the machine and look at the ways in which humans play games.

The task is made all the more difficult as the human mind performs evaluation tasks, such as choosing almost automatically which piece to move next on a chess board by looking at the patterns set up on the board and the relationships between the pieces.

A computer cannot perform in the same way as a human brain, as it cannot think in terms of concepts, mental pictures, or even words. It also has no way to evaluate situations about which it has not been told by one of its programs or, directly, by a programmer.

To circumvent that difficulty programmers have had to limit the power of programs which play games such as chess and find ways of representing play patterns in a form which can be read by the computer. The most obvious, and primitive, way is to give a numeric representation to situations and objects which the computer can then hold in its memory.

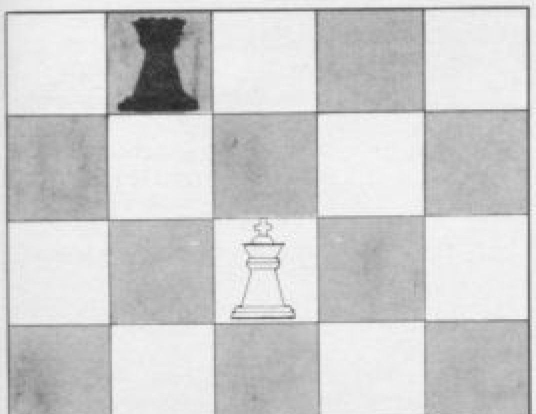


Figure 1. Knight threatens King

The way in which the patterns are held and used to represent events in a program depends on the type of game being played. The two main categories are strategy, which I will look at now, and adventure, which I will discuss in the next article.

The strategy type of game can be subdivided further into games such as **Stonkers** — which depend on events and positioning to win — and games such as chess which depend on the pattern of relationships between playing pieces. Those differences may be subtle but it is easy to see them if you look at how a computer plays chess.

In a game such as chess the pieces are given numbers to signify the rank they hold. For instance, pawns might each be given the value one — on a scale of one to 10 — and the Queen might be given the value nine. The reason is that pawns can move across only one or two squares at a time, whereas Queens can move any number of squares, either vertically, horizontally or diagonally.

That is not sufficient, though, as the positions which the pieces may take in a game need to be evaluated. During the opening, therefore, the squares on the board are given values which correspond approximately to their importance during the first few moves. At that time the important central squares of the board might be given the value of 10 and the wing squares, used by pawns and rooks, might be given two, since they are not so important.

The values of the squares will start to change as the computer takes account of which enemy pieces are threatening the squares and which pieces are on them.

The mechanics of looking at squares opposite a position are simple but repetitive to perform. For instance, if the board was held in a two-dimensional Basic array — figure one — the computer would take account of the pieces in the array — Rook, Knight and Queen — which are near the position of the white King from which the computer is scanning.

By finding the 'rank' numbers of the pieces which are in opposition to the white King and the numerical importance of the squares on which they are sited the computer will then be able to tell which pieces, if any, are a threat. In figure one the Knight would be the overt threat.

The fundamentals of numeric analysis are not the only factors which are important to the computer during play. It also needs a game strategy, a set of rules which it follows continually in conjunction with its number play.

Most chess programs look first to see whether they can force a checkmate. If not, they will then look to see if any allied pieces are in danger and their value and importance. That done, it will see if it can take any other pieces, using the numeric representation of pieces and playing squares to determine the best moves. That process continues until the first option, checkmate, is fulfilled or it is mated itself.

The same kind of tactics can be applied to strategy games such as Stonkers from Imagine Software which, I am told, uses sophisticated artificial intelligence algorithms.

For instance, the game could be set in the countryside where two armies are fighting. The lay of the land can be split into sectors using a grid and each of the sectors can be given a value depending on their importance.

An example of a typical war game scenario is:

PIECES	
Tank	9 points
Artillery	4 points
PLACES	
Trees	1 point
Lakes	−1 point
Flat	5 points
Hill	9 points

To obtain a position rating you must add the piece points to those of the place on which that piece stands in the scenario.

From the points list it is obvious that artillery which is shooting on flat ground — 4+5=9 — would have no chance against a tank on a hill — 9+9=18. A massacre would result and the computer could predict it using the numeric tables stored in its memory.

In a professional war game the programmer has much more to think about than the values of positions and pieces. The weather also has to be taken into consideration, as well as the pace at which armies can march.

All those aspects can be represented in numeric terms on a scale of one to 10 or even one to 100. The manner in which it is done is the prerogative of the programmer.

The area of strategy gaming is one in which it is easy to see that a programmer has to do more than write computer code. Most of the work is performed away from the computer and usually involves compiling a version of reality into a file of numbers which can be fed into a computer.

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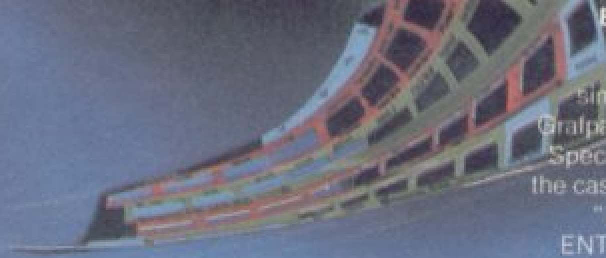
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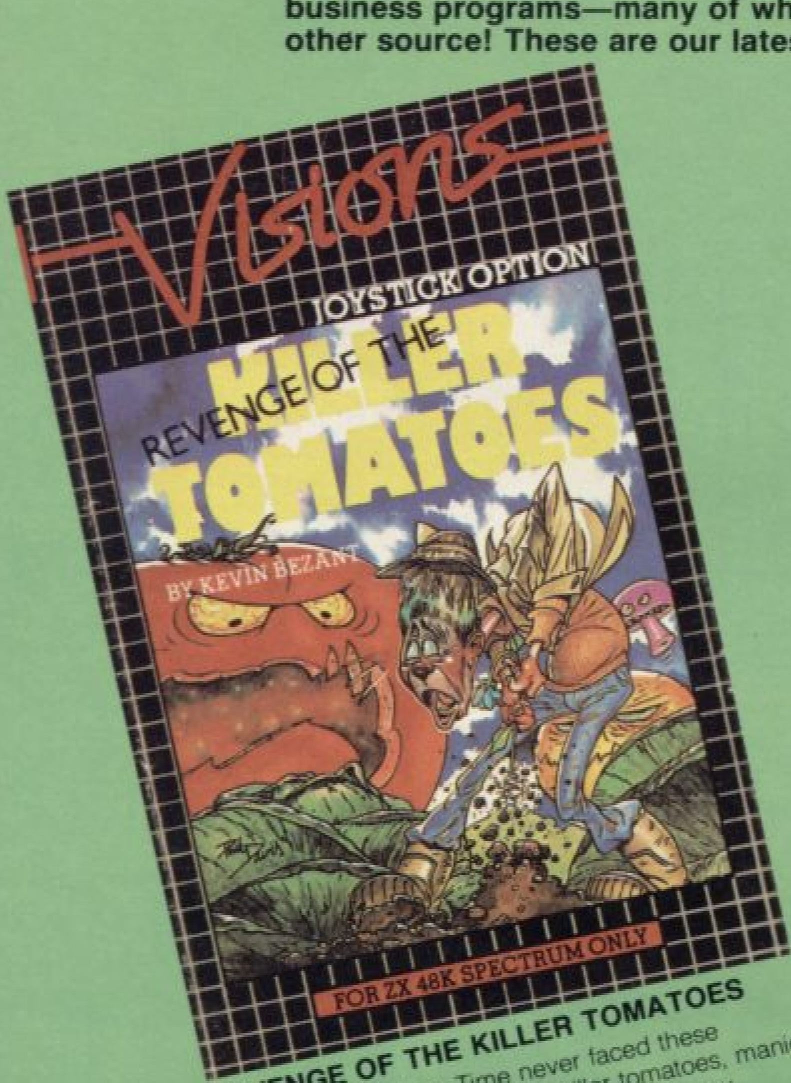
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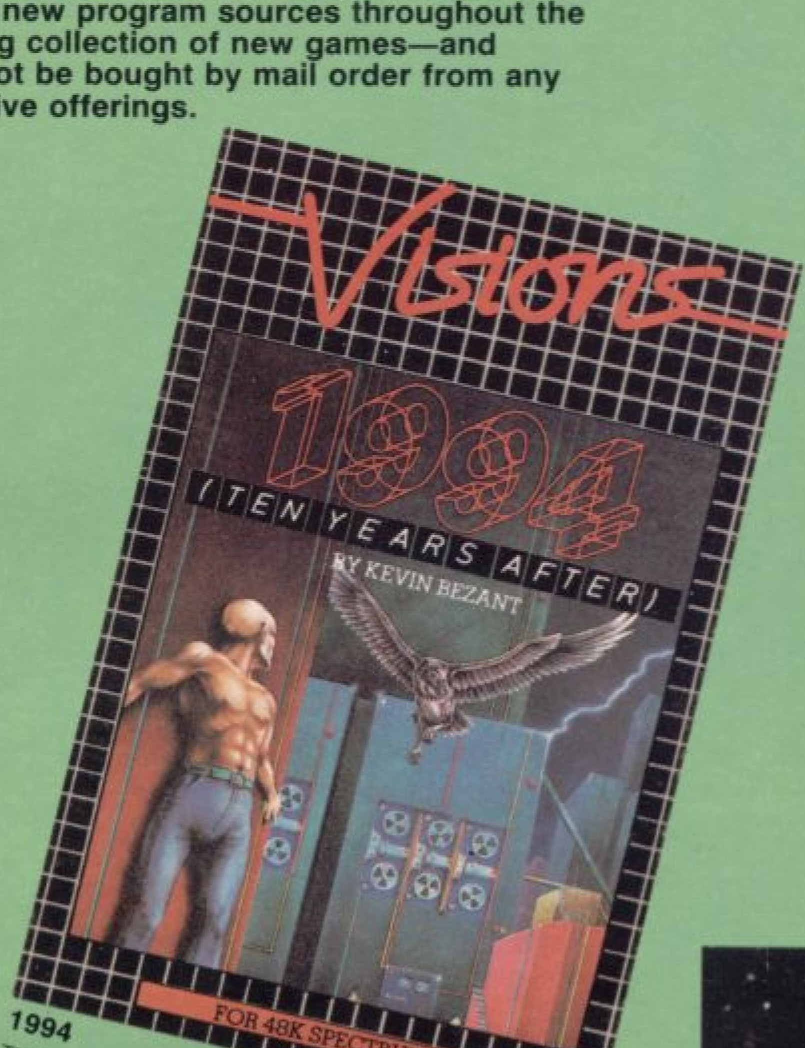


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The mathematics of music

Andrew Hewson analyses sound and lists a simple security program

WHAT IS the formula for calculating the frequency and duration of a note as needed by the ROM routine at 03B5? asks Richard Hyde of Bourne End, who wants to use a Spectrum to create music.

Before answering the question I shall describe how the Spectrum BEEP command works. Chapter 19 in the manual explains that the command has two parameters which determine the duration and pitch respectively of the note to be produced. The duration is measured in seconds and the pitch is in semitones relative to middle C. Thus the command:

BEEP 0.5,1

causes the computer to play C sharp — one semitone above middle C — for half a second.

Three separate ROM routines are used when a note is to be played. The first is the command interpreter which determines that it is the BEEP command which is to be executed, as opposed to PRINT or DIM. It also places the two parameters in floating point form on the calculator stack. It then passes control to the BEEP command routine located at address 03F8.

That routine converts the duration and pitch parameters to two new numbers. The new parameters are passed in the DE and HL register pairs to a third routine located at 0385 which drives the loudspeaker, causing the correct note to be produced.

The third routine drives the loudspeaker by toggling — i.e., switching rapidly on and off — the low voltage supply to the loudspeaker electromagnet. That causes the cone of the loudspeaker to vibrate, thereby generating an audible sound. The two parameters passed to the routine control the number of times the toggling takes place and the rate of repetition.

Thus the answer to Hyde's question is in the BEEP command routine and in particular in the conversion of the pair of parameters but before considering the routine in detail a digression on the mathematics of music is necessary. To assist the non-musical reader some basic terms are defined in table one.

An octave is a "natural" separation between two notes which most people can detect readily. Raising a note by an octave is equivalent to doubling the frequency of the note. For example, while the frequency of middle C is about 262 cycles per second, the frequency of the note an octave higher, called upper C, is about 524 cycles per second. Similarly the frequency of the note an octave higher still is about 1,048 cycles per second.

If all the notes ever played were octaves of middle C, music would be very uninteresting and the average piano keyboard would have about seven notes. Hence to add variety each octave is divided into 12 semitones. Those



• *Please address problems and queries to Andrew Hewson, Helpline, Graham Close, Blewbury, Oxfordshire.*

semitones are approximately evenly-spaced in the logarithmic scale of frequency, i.e., the difference of the logarithms of the frequency of adjacent pairs of semitones is approximately the same. Each of those semitones are related octave notes above and below, thus generating the 70-odd notes on the piano keyboard.

It would be possible to create all notes from a single reference frequency, stepping up or down by the required number of semitones by adding or subtracting the logarithmic increment the required number of times. Sinclair has chosen not to do that. Instead, the frequencies of all 12 semitones in a single reference octave are stored in floating point form in ROM at address 046E. Higher notes are obtained by doubling or quadrupling those frequencies, lower notes by halving or quartering.

The frequencies and the names of the notes are listed in table two. The logarithm to base 10 of each frequency is also listed in table two and it is clear that the difference in each adjacent pair of logarithms is about 0.025.

The BEEP command routine uses the table to calculate the required frequency from the pitch parameter as follows:

The required semitone is determined from the result of the calculation

SEMITONE=12*INT (PITCH/12)

That gives a value in the range of 0.0 to 11.99. The integer part of that number determines which semitone is selected. The frequency is then adjusted upwards using an approximate calculation to take account of any non-integer remainder.

The required octave is determined from the calculation

OCTAVE=INT (PITCH/12)

The frequency obtained from the first part of the calculation is then doubled or halved the appropriate number of times. For example, it is doubled once if OCTAVE=1, twice if OCTAVE=2, halved once if OCTAVE=−1.

To complete the conversion of the first parameter, the frequency obtained, measured in cycles per second, is multipled by the duration parameter, in seconds, to give the total number of times the loudspeaker supply line must be toggled. The result is passed to the BEEPER routine at 03B5 in the DE register pair.

The second parameter passed to the BEEPER routine controls the interval of time between each toggling of the loudspeaker line. That time interval is not measured in seconds but in the number of "T states" divided by four for which the BEEPER routine is to remain in a delay loop before switching the loudspeaker line on or off again. A T state is the period of time the Z-80 microprocessor takes to execute the fastest instruction. In the Spectrum there are 3,500,000 T states per second. The steps in the calculation are:

Divide 3,500,000 by the frequency of the required note; divide the result by four; subtract 30.125 to take account of overheads at the beginning and end of the delay loop. The result is passed to the BEEPER routine in the HL register pair.

I have written previously that POKEing numbers into RAM is the equivalent of putting a spanner in the

continued on page 135

48K SPECTRUM

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continued from page 133

works. POKEing causes no permanent harm but you should not be surprised if you cause the Spectrum to crash.

Peter Read of Zimbabwe stumbled on a useful facility by POKEing at random. He writes: **If you enter a clear command and the POKE zero into the next but one and the next but two lower bytes in RAM, the Spectrum will continue to work normally until it reaches the end of the program or the break key is pressed at which point it will crash.**

Why? It is not necessary to enter the CLEAR command to obtain that effect. CLEAR re-sets RAMTOP to a new address. RAMTOP in the 48K Spectrum is set initially to 65367 and the short program listed in table three will function normally until it finishes or the break key is pressed, at which point it will crash, as Read describes.

The reason for that effect is that the two locations altered by the POKE commands together contain the address to which the processor jumps when an error occurs. That fact can be demonstrated by examining the ERR SP system variable held at location 23613. In the 48K Spectrum that system variable contains 65364, which is the address of the lower of the two locations which are POKEd in the program. Thus ERR SP points to the address which points in turn to the address to which an error jump is made. The procedure seems complicated but it provides a system with a great deal of flexibility.

The locations normally contain 3 and 19 respectively and so the address to which they point is:

Address = 3 + 256*19 = 4867 = 1303 (hex).

That location is in the middle of the main execution routine. The Spectrum then prints the error number and awaits an input from the keyboard.

The effect of re-setting those two addresses to zero is to cause the Spectrum to jump to ROM address zero, the equivalent of pulling out the power supply plug and starting again. Hence that gives a useful way of protecting your programs against unauthorised inspection.

Term	Definition
Middle C	A note commonly used as a reference point. It lies approximately in the middle of the human range and the piano keyboard. Sinclair assigns it a frequency of 261.63 cycles per second.
Frequency	The number of complete oscillations or cycles per second of a note.
Pitch	The musical term equivalent to frequency. A female voice usually produces high-pitched notes, i.e., high-frequency notes.
Octave	Two notes are said to be an octave apart if the frequency of one is double the frequency of the other.
Semitone	Two notes are said to be a semitone apart if the logarithm of the frequency of one is one-twelfth bigger than the logarithm of the frequency of the other.

Table 1. Some musical definitions.

Note	Frequency	Log frequency — to base 10
Middle C	261.63	2.418
C sharp	277.18	2.443
D	293.66	2.468
D sharp	311.13	2.493
E	329.63	2.518
F	349.23	2.543
F sharp	369.99	2.568
G	392.00	2.593
G sharp	415.30	2.618
A	440.00	2.643
A sharp	466.16	2.669
B	493.88	2.694

Table 2. The semitone table used by the Spectrum.

```
10 POKE 65365,0
20 POKE 65364,0
30 FOR I=1 TO 1000
40 PRINT AT 0,0;I
50 NEXT I
```

Table 3. A Spectrum program which executes normally until the break key is pressed or until it finishes. The computer then crashes.

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Horace and the Spiders	Sinclair	8
Horace Goes Skiing	Sinclair	8
Hungry Horace	Sinclair	8
Invasion Force	Artic	8
It's the Wooluf	Crystal	5
Jet-Pac	Ultimate	8
Labyrinth	Axis	4
Leap Frog	CDS	*
Light Cycle	PSS	*
Luna Crabs	Micromega	7
Magic Meanies	CDS	2
Maze Chase	Hewson	8
Meteor Storm	Quicksilva	7
Meteoroids	dK' Tronics	7
Meteoroids	Softek	6
Millypede	Add-on	7
Mined Out	Quicksilva	7
Moon Buggy	Visions	6
Mr Wong's Loopy Laundry	Artic	6
Muncher	Silversoft	*
Muncher	Silversoft	6
Nanas	Mikro-Gen	*
Orbiter	Silversoft	7
Ostron	Softek	*
Pengy	Micromania	4
Pitman Seven	Visions	*
Planetoids	Sinclair	8
Proteus	Abacus	5
Rapedes	Visions	*
Repulsar	Softek	*
Rider	Virgin	6
Road Toad	DK Tronics	7
Robot Panic	Soft Mill	1
Sam Spade	Silversoft	5
Santa	Artic	*
Sentinel	Abacus	7
Shark Attack	Romik	5
Sheer Panic	Visions	7
Slippery Sid	Silversoft	8
Space Fighter	Winters	*
Space Intruders	Quicksilva	7
Space Lanes	Cathedral	*
Space Raiders	Sinclair	6
Space Zombies	Mikro-Gen	*
Spec. Frogs/ Showdown	Artic	*
Spec. Gobbleman	Artic	*
Spec. Invaders	Artic	*
Spec. Invasion Force	Artic	*
Spec. Scramble	Work Force	7
Spectipede	Mastertronic	5
Spectipede	R and R	8
Spectral Invaders	Bug-Byte	8
Spectral Panic	Hewson	5
Spectres	Bug-Byte	6
Strike Four	Spectresoft	4
Styx	Bug-Byte	7
Sub	Romik	*
Tank Battle	dK' Tronics	8
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Train Game	Microsphere	9
Trom	dk'Tronics	4
Vortex	JK Greye	5
Winged Warlord	CDS	6
Wizard's Warriors	Abersoft	*
Yomp	Virgin	7

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Finance Manager	OCP	9
Home Computer Pack	SD Micro	*
Masterfile 16	Campbell	*
Matcalc	Work Force	*
Micropen	Contrast	*
Vu-Calc	Sinclair	7
Vu-File	Sinclair	8

Education

Alphabet	Widget	*
Alphabet Games	Sinclair	*
Apostrophe	Sinclair	7
Ballooning	Heinemann	*
Calpac 1-3	Calpac	*
Car Journey	Heinemann	*
Cargo	Sinclair	*
Chess Tutor	Artic	7
Counting	Starter Soft	*
Counting	Widget	*
Education One	Lerm	*
Educational	Startersoft	*
Firework Music	Soft Cottage	8
First Numbers	Collins	*
40 Education Games	Granada	*
Four Rules of Number	Micro Master	*
French Voc Test	Tutorial	*
Hidden Letters	Poppy	*
Hot Dot Spotter	Longman	*
Integration	University	8
Intermediate English 1-2	Rose	*
Intermediate Maths 1-2	Rose	*
Know Your Tables	Collins	*
Language Devel. Series	Glasson	*
Language Devel. Series	Micro Master	*
Learn Basic	Logic 3	*
Learning Read 1	Poppy	*
Linear Programming	University	*
Marks Book	Lerm	*
Maths Invaders	Stell	*
Maths Tutor	AD Software	*
Matrix Operations	University	7
Money	Poppy	*
Night Sky	Bridge	*
Number 6	Prime	*
O Level Maths	Homestudy	*
O Level Physics	Homestudy	*
Paddington's Shopping Mix-up	Collins	*
Pathfinder	Widget	*
Polynomials	University	8
Pre/early school cassettes	Essex	*
Primary Arithmetic	Rose	*
Punctuation Pete	Heinemann	*
Regression	University	8
Self-teach Program	Anvil	*
Shape Sorter	Widget	*
Special Agent	Heinemann	*
Spellbin	Startersoft	*
Teacheraid	B Farris	*
Use and Learn	Microl	8

Language

Beta Basic	Betasoft	9

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Countries of the World	Hewson	8
Cycle Planner	Medidata	4
Map of the UK	Kuma	7
Shopping List	SD	*
Spectasort	Spectadraw	4

Puzzle

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Hanoi King	Contrast	7
Lojix	Virgin	3
Nowotnik Puzzle	Phipps	7
Quazar	Rose	4

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Air Traffic Controller	Hewson	6
Airliner	Protek	6
Golf	R & R	7
Golf	Virgin	7
NightFlite	Hewson	5
Print Shop	CCS	8
Pro-Golf	Hornby	7

Strategy

Auto Chef	CCS	*
Big Match Soccer	Winters	*
Dallas	CCS	6
Dictator	Bug-Byte	*
Farmer	CCS	*
Football	Winters	*
Heathrow	Hewson	8
Las Vegas	Temptation	*
Quincy	Severn	*

Traditional

Backgammon	Hewson	*
Bridge Tutor	CP	8
Bridgemaster	Bridgemaster	9
Challenge	Temptation	*
Gambling Tape	Dymond	*
Las Vegas	Temptation	5
Odds-on	RSD	*
Othello	CP Software	*
Pinball	Winters	*
Pool	Bug-Byte	7
Reversi	Sinclair	8
Roulette	Newsoft	*
Solo Whist	Video Soft.	*
Spec. Microchess	Artic	*
Super Play I	Video	*
Tennis	Winters	*

Utility

Aspect	Bug-Byte	5
Audio Sonics	Work Force	4
Auto Sonics	Buttercraft	5
Basic Utilities	Jaysoft	6
Character Generator	Spectrasoft	*
Dietron	Custom	6
Disassembler	dK' Tronics	7
Display	Work Force	*
Editor/Assembler	Picturesque	8
Extended Basic	CP	7
FP Compiler	Softek	9
Keysounder	S and G	*
Letterfont	Allanson	8
Machine Code Test Tool	OCP	7
Master Toolkit	OCP	7
MCoder	PSS	8
Micropen	Contrast	*
Print Utilities	Sinclair	7
Programmer's Dream	Work Force	8
Renumber Delete	Work Force	*
Slow Loader	ELR	9
Sound FX	dK' Tronics	6
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Spectrum Super Toolkit	Nectarine	8
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Supercode	CP	8
Taswide-64	Tasman	*
Trace	Texgate	8
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Adventure

Abyss	CCS	6
Ace in the Hole	Add-on	*
Adventure 1	Abersoft	6
Adventure Island	Contrast	*
Alchemist	Imagine	*
Arcane Quest	Add-on	*
Atlas Assignment	Virgin	7
Black Crystal	Carnell	7
Black Dwarf's Lair	Newsoft	*
Black Planet	Phipps	7
Byte	CCS	3
Castle Blackstar	SCR	7
Circus	Dig Fant	8
Classic Adventure	Melbourne Hse	*
Colditz	Phipps	8
Colossal Caves	CP	8
Cry Wolf!	Add-on	*
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Demon Lord	MCE	5
Detective	Arcade	7
Devils of Deep	Shephard	*
Diamond Quest	CCS	4
Diamond Trail	Gilsoft	7
Dragonsbane	Quicksilva	6
Dungeon Master	Crystal Comp.	8
Dungeons of Doom	Temptation	3
Espionage Island	Artic	5
Everest Ascent	Shepard	6
Fantasia Diamond	Hewson	7
Golden Apple	Artic	7
Gorgon	Phipps	*
Halls of Things	Crystal Comp.	9
Here comes the sun	Alligata	7
Hobbit	Sin/Melborne Hse.	9
Hole	Add-on	*
Horror Atoll	Add-on	*
Inca Curse	Sinclair	6
Inferno	Shephard	7
Invincible Island	Shephard	8
Island	Crystal	4
Island	Virgin	7
Jericho Road	Shards	7
Jungle Adventure	CCS	4
Knight's Quest	Phipps	6
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Quetzalcoatl	Virgin	8
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Ship of Doom	Artic	7
Solaris	Softel	*
Superspy	Shepherd	5
Terror from The Deep	Add-on	*
The Castle	Bug-Byte	*
The Orb	Comp. Rentals	*
Time Quest	Mikro-Gen	*
Transylvanian Tower	Shepherd	7
Urban Upstart	Shepherd	
Valhalla	Legend	7
Vampire Village	Terminal	4
Velnor's Lair	Quicksilva	8
Volcanic Dungeon	Carnell	6
Ziggarat of Dread	Add-on	*

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Ad Astra	Gargoyle Games	8
Adven. St. Bernard	Carnell	7
Android Two	Vortex	*
Ant Attack	Quicksilva	8
Antics	Bug-Byte	8
Arena 3000	Microdeal	5
Armageddon	Silversoft	3
Atic Atac	Ultimate	8
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Bear Bovver	Artic	8
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Blade Alley	PSS	6
Blue Thunder	R Wilcox	6
Brain Damage	Silversoft	*
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Bubble Trouble	Arcade	*
Bugaboo	Quicksilva	7
Caesar the Cat	Mirrorsoft	7
Carnival	Eclipse	5
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Centipoid Plus 3	Orwin	5
Chequered Flag	Sinclair	8
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Lazatron	Contrast	*
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Manic Miner	Bug-Byte	9
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Mission Impossible	Silversoft	6
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Moon Alert	Ocean	*
Mr Wimpey	Ocean	7
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Orion	Software Projects	5
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Spectron	Virgin	6
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Stop the Express	Sinclair	8
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Accounts (Limited Company)	Hestacrest	*
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Address File	SD Micro	*
Address Manager	OCP	7
Bank Account System	K Gouldstone	8
Bank Verifier	SD Micro	*
Business Bank Account	Transform	*
Cash Controller	Shepherd	7
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Critical Path Analysis	Hilderbay	*
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Stock Control	Transform	*
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Angle	Chalksoft	5
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Castle	L'Ensouleiado	7
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Chess Tutor 1	Sinclair	7
Cortes	L'Ensouleiado	6
Countabout	Longman	*
Eiffel Tower	Chalksoft	6
Electronic Learner's Guide No. 1	ETST	6
French is Fun	CDS	5
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German is Fun	CDS	8
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Guitar Tutor 1	Harlequin	*
Guitar Tutor 2	Harlequin	*
Handwriting	Chalksoft	*
Hotline	Chalksoft	5
Humpty Dumpty	Widget	8
Inkosi	Chalksoft	5
Jungle Jumble	Clever Cloggs	*
Jungle Maths	Scisoft	*
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Letters and Numbers	Jimjams	*
Linkword	Silversoft	6
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Mathskills II	Griffin	7
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Mr. Men	Mirror	*
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Musicmaster	Sinclair	6
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O Level Chemistry	Calpac	*
O Level Physics	Think Tank	*
Party Time	C. Tutor	*
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Quick Thinking	Mirrorsoft	*
Sequences	Chalksoft	5
Spanish Gold	Chalksoft	*
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Speech Marks	Sinclair	7
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Star Reader	Scisoft	*
Startrucker	Widget	7
Teacher Data	B Farris	8
Tense French	Sulis	7
Time Traveller	Willey	*
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Whizz Kid	Comp. Tutor	*
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Angler	Virgin	6
Apocalypse	Red Shift	*
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King Arthur	E. Midland	*
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Sheepwalk	Virgin	7
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Warlord	Lothlorian	*
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Bullseye	Mastertronic	4
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Original Superchess	CP Software	*
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Roulette	Dymond	*
Scrabble	Sinclair	8
Snooker	Visions	*
Superchess II	CP	8
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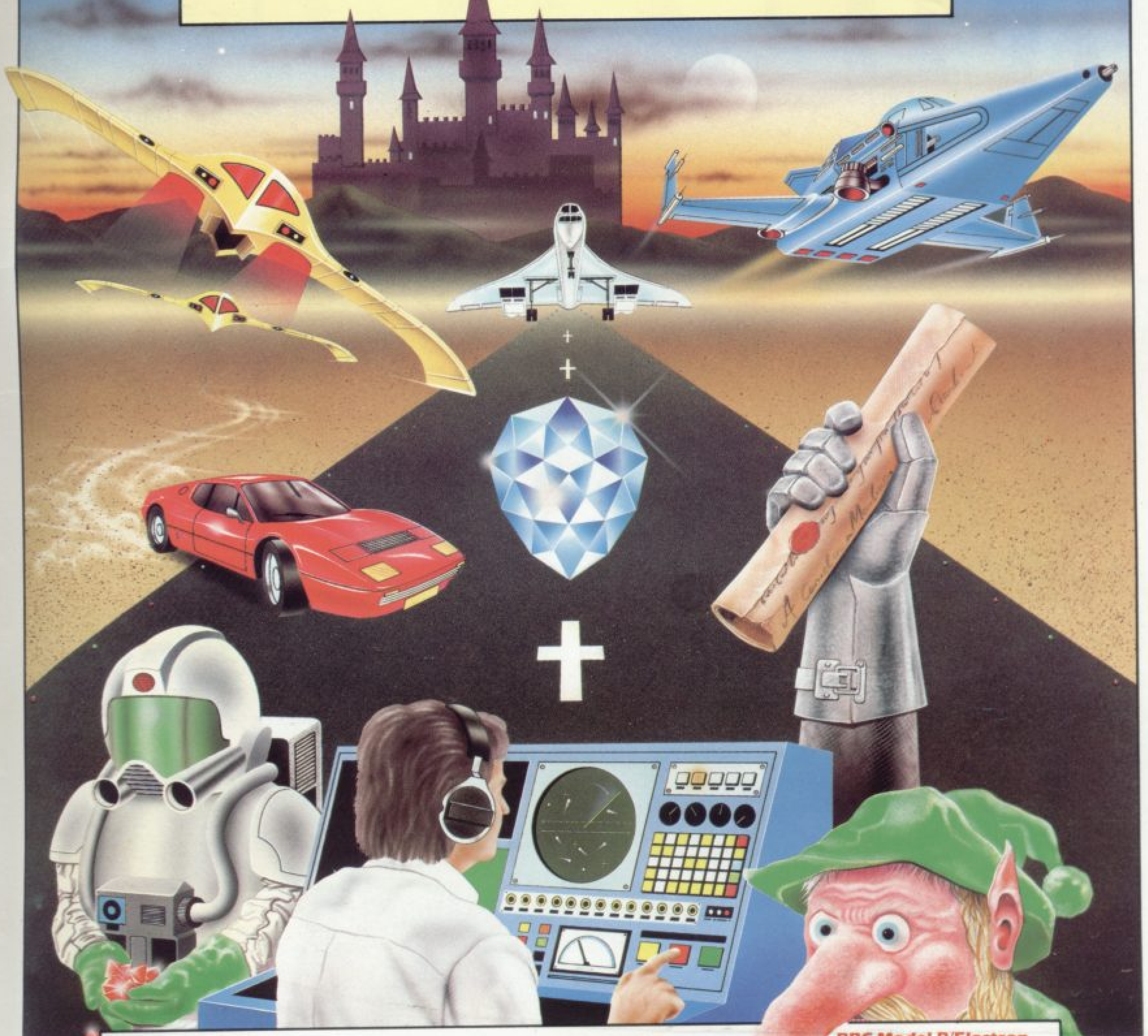
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